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THINKING AS BEHAVIOR

by

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IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE

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FACULTY OF GRADUATE STUDIES AND RESEARCH

The undersigned certify that they have read, and recommend to the Faculty of Graduate studies and Research, for acceptance, a thesis entitled .....

.....Thinking as Behavior.....

.....

submitted by ..Agnes Joan Crawford.....

in partial fulfilment of the requirements for the degree of Master of .Education.

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ABSTRACT

The experimental work reported in this thesis attempts to test two central hypotheses: 1. Thought is a form of behavior subject to laws similar to those which explain motor and verbal behavior; 2. An understanding of behavioral laws and scientific principles can have specific therapeutic value.

In so doing, it makes use of the basic principles and assumptions of scientific method of radical behaviorism. Additional principles and many of the analytic methodologies employed originated in previous studies in the same experimental series.

Thought as a subject-matter presents extreme difficulties to the experimental psychologist. In testing the second hypothesis, these difficulties were tackled by operationalizing 'internal processes' in terms of overt behavioral accompaniments. In the test of the first hypothesis, the method of recall of thought activity and verbal report was adopted to subserve the same purpose. In both cases, the resulting objective behaviors were coded with the aid of behavior observation instruments. The coded behavioral patterns were then analyzed in terms of their occurrence (second hypothesis), and their functional relationships with surrounding stimuli (first and second hypotheses). A more precise method of functional analysis

was used in the test of the first hypothesis, than in the test of the second.

While the method of testing the second hypothesis is more definitive than the method of testing the first hypothesis, both techniques are still being developed - especially in relation to the problems presented by thought behavior. The central purposes of the present study are to determine how these methodological techniques and the experimental design as a whole, might be altered to provide more definitive evidence about the hypotheses considered and, hopefully, to gain objective information about the nature of the thought process itself.

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CHAPTER I

HISTORICAL

It is clear from the written records that from an early period, man has asked questions in an attempt to understand human behavior: this sometimes included his own thinking processes. Initial explanations relied heavily on magical and religious theories. The ancient Egyptians, the Semites and the Greeks were especially concerned with these problems. Naturalistic and theological views were in conflict as far back as classical Greek times.

During the seventeenth and eighteenth centuries, the development of mechanistic and rationalistic concepts led into the beginnings of experimental psychology and the behaviorist school.

The study of behavior as a science is rooted in early naturalistic classifications of behavior, especially the Greek atomists Democritus and Epicurus. These concepts lay dormant for almost 2,000 years as theory (dualistic concepts) dominated the intellectual scene. But by the 17th century Descartes, in his concept of the reflex arc, was willing to speculate on the concept that man's movements and behavior in general, followed some lawful order. Bacon and Hobbes in England were also extremely significant figures in this development. Others

followed in these footsteps and began to relate precise ways of responding to particular events in the organism's environment. This relationship between environment and movement opened the way for an empirical approach to the analysis of behavior.

In the 20th Century (1894), Pavlov's work with reflexes introduced the relationship between responses and certain training operations in the organism's history. This work (anticipated as a program by Sechenov) led to an increasingly scientific approach to the study of behavior and the discovery of laws to predict and control it. It is only recently in the work of Skinner and other radical behaviorists that the early naturalistic concepts of the Greek schools have been combined with the more recent objective methods of the empiricists.

The rationalists considered the source of behavior as given, and to be explained in terms of an analysis of the "inner man". Most of the early classical philosophers represented this point of view (stemming from Plato and Socrates). On the other hand, the empiricists emphasized the role of the environment and mans' relationship to it. The empiricist school continued to develop as techniques and knowledge grew in methods of observation and control of experiments. The rationalists were basically non-objective (and certainly non-inductive) in their approach. Their studies fell into the area of philosophy

of which psychology was considered a branch. The empiricists were more scientific, only accepting observable data. Most theories of thought have been caught up in one or other of the two systems. Continuing the work of the radical behaviorists we are seeking to find an acceptable method and rationale for handling the collection and interpretation of thought processes as an objective process - that is, thought as behavior.

The rationalist thinking was initiated because man saw his world as being essentially two-fold. There was the natural world which followed a pattern of seasons and reasonably predictable events and an "unnatural" world of disease, death and destruction for which no causal relationship seemed possible. From these concepts the idea of dualism developed. For example, body and soul came to be regarded as two distinct things - capable of interaction but distinct in substance. Thus by attributing a "spirit" or "will" to man and inanimate objects an explanation of many "unnatural" events was possible.

The dualism of the rationalists (which counterposed "mind" to "matter") flourished for many centuries. An early exception to this approach was Democritus in the fourth century B.C. He anticipated many of the broad generalizations on which modern empirical science is based - the indestructibility of matter and the conservation of energy. He presented a monistic theory to account for

man's characteristic qualities. He believed that true knowledge of reality was possible, although he differentiated between knowledge gained directly through the senses and 'true-born' knowledge which came more indirectly from outside the self (Esper, 1964).

Other Greek philosophers attempted to reconcile the traditional mind-body dualism with a monism, not by elaborating on Democritus' environmental approach, but by insisting that the mind alone was at the root of everything. Human thought and logic were their concern. This was the idealistic trend in philosophy. They a ssumed that only by a superior wisdom which could conceptualize the universe as a shadow world reflecting an ideal, non-material universe could the world about them be understood. Knowledge of the properties of matter and techniques of experimental testing to describe the "ultimate nature of the universe" were regarded as misconceived. True knowledge could only be obtained by a process of logical deductions ("dialectic") from the qualities of words, thoughts and other mentalistic constructions.

Many groups and individuals continued the search for the nature of man and the understanding of his behavior. The Sophists emphasized pragmatics of social living without regard to the "true" nature of reality, while Socrates stressed the ethical and mentalistic analysis of reality. Plato turned from the shifting

(allegedly) unintelligible world of sensations to a hypothetical "self"-created world of pure thought. He stressed the fundamental distinction between "body" and "soul". Aristotle, while maintaining this dualistic approach, was also concerned with purpose (teleologically defined) - what the object does, and how it operates in terms of immediate and final purposes.

Aristotle was something of an empiricist, describing and interpreting human experience and behavior in concrete terms, returning to a study of the senses, the emotions, and reasoning and memory. Behavior, for Aristotle, was a product of processes in the organism as well as environmental factors. (Esper, 1964). However, the alleged dichotomy between 'animal' function and 'rational' soul more aptly fitted the religious dominated philosophy of his and later times. It was his dualism, rather than the principles of empirical enquiry which Aristotle proposed, which was selected by history for emphasis and survival.

Aristotle, however, did leave us with the theory of the "association of ideas" based on the principles of contiguity, similarity and contrast. From this doctrine of association, which posits that recalling occurs as experiences succeed one another in "memory", much of the theory of learning as well as the theory of human thought has evolved. This implies that the psychology of

thinking and learning is riddled with the Aristotelian dualism and teleology.

The shift from Aristotle's dualistic dogma started with the birth of science and the contradiction between a priori method and empirical knowledge in the works of men like Copernicus, Galileo and Newton. It was Bacon, through his renunciation of the ancient philosophers, who conceived the possibility of an empirical science which would abandon mentalistic constructions derived from theology and the ancients.

The English Associationists in the seventeenth century saw the doctrine of mental association as a way of explaining the origins of human knowledge.

Although there were numerous exponents of this theory of association (Hobbes, Locke, and later James and John Stuart Mill) - the concept was basically that all mental life arises from sensations. As a product of corresponding sense organ stimulations, experiences became "ideas". Sensations or images can reproduce a chain reaction which has occurred on previous occasions in the temporal contiguity with the original sensation or idea (Esper, 1964).

While all of these men were associationists to a degree, some were more empirically minded than others (Priestley, Locke, Hartley). Some tried to go beyond simple associations and adopt a "common sense", intro-

spective approach to the study of the human mind. Starting from their own careful observations they made generalizations centering around the laws of association and the ways in which "mental" events were connected.

During the nineteenth century associationism reached its peak. Aspects of it became linked (after 1859) with the theory of evolution and led to a new interest in the environmental determinants of overt behavior. The publication of Charles Darwin's Origin of Species (1859) and The Descent of Man (1872) profoundly influenced man's thinking about his own position and purpose in the universe. Huxley also published Man's Place in Nature (1863). No longer was man a special creation of a Divine Mind but simply a product of a selective 'process' related to his evolutionary adaptation to the environment. Darwin's work recognized not only the natural but also the psychological relationship between man and other animals, especially mammals. The development of the genetic method and the new evolutionary viewpoint, led to the empirical investigation of association and imagery (for example, Galton). The idea that images were the main substance involved in thought resulted in the earliest true experiments in the psychology of thinking.

Wundt, through his use of association as a basic principle in his new experimental psychology, was a primary influence. His laboratory problems covered

many areas. He laid down very precise rules for the use of the introspective method. In his insistence that the essence of any experiment lies in observing the changes in the experience of the observer, he made a major contribution to the forces of empiricism.

There were other important contemporaries and successors of Wundt in Germany. The most significant figure is that of Ebbinghaus who made a pioneer, objective study of memory, learning and forgetting (without recourse to the introspective method). He set himself the task of memorizing lists of varying lengths of three letter nonsense syllables. By recording and comparing the length of time it took him to learn (up to the point of one errorless reproduction) short lists of words, compared with longer lists he was able to get a quantitative assessment of how much had been remembered or forgotten. The use of nonsense syllables, of course, was to avoid the possibility of 'ready made associations' with the material. Thus he devised a methodology (single subject, objectification by means of a quasi-introspective technique which investigates "inner processes", an operational definition of a "higher mental process"). Through these meticulously controlled experiments, Ebbinghaus objectified the process of memory. His curve of forgetting indicated the operation of causal laws in this area.

It was at this time that the "Würzburg School"

set up a series of experiments to broaden the use of introspection. The Würzburg School continued the study of the qualitative nature of association. Thought and association seemed closely related, but to be scientific a more precise method of observation had to be applied to the study of these subjects and their responses. Watt, through 'systematic experimental self observation' proposed to account for the sequence of the thinking process (Humphrey, 1951). Watt presented his subjects with a stimulus card and the task (Aufgabe) was to classify it in some way, for example, to name an example of it, to name a "whole" to which it belonged. The time for the response was recorded as were the elaborate introspections made after each word. Specific stages of the thinking process which manifest themselves between the subject's preparation for the stimulus card and the spoken response were analysed. Thus Watt's method made possible a more precise breakdown of the steps in the thinking process.

However, as the behaviorists of the day gleefully pointed out, the Würzburg and the Leipzig Schools of introspectionists were unable to decide the question of "imageless thought". This was a crucial test of the introspection method. Its failure to answer the question discredited the work of all psychologists using it. The introspectionists developed many mentalistic formulations which still befog our understandings.

The historical course of associationism divides after John Stuart Mill. One line, which started from the empirical laboratory of Helmholtz, reached down through Meyer and Weiss to the American functional psychology. Helmholtz was a man of wide interests and great genius. Educated in physiology and physics, he was instrumental in applying the same systematic experimental approach he had used in his early studies on such subjects as the principle of the conservation of energy to several branches of psychology. These included the laws of perception and the nature of scientific observation. Another side line of associationism reached America by travelling through Russia.

The immediate antecedents to the work of Watson were to be found in the writings of two Russian physiologists, Sechenov and Pavlov. Their behavioral studies on reflex theory, while primarily in the field of physiology, supplied a theoretical model which was largely ignored by the American behaviorists who followed Watson. Sechenov, who had worked with Helmholtz, identified reflexes as being innate or learned. Learning itself was a process of association obtained through environmental stimulation. Thinking, to Sechenov, was an inhibited reflex. The principle that the organism is inseparable from its environment is basic to Sechenov's work (McLeish, 1975). However, it was Pavlov who examined these foundations

through experimental study.

On the basis of his extensive work on conditional reflexes, Pavlov (1927) posited that higher processes such as speech, constituted a "second signalling system of reality" which is governed by the same fundamental laws of the reflex as governed the "first signalling system" (motor responses). In his desire to establish a science of behavior which would replace the mentalism of the introspectionists, Pavlov insisted, that his experiments on the physiological activity of the cerbral cortex were really investigations of behavior which he conceived to be "higher nervous activity".

While ideas from many sources filtered across the Atlantic, it was principally the introspective study of mental life, so vigorously pursued on the Continent and in Great Britain, that was attacked by the early American behaviorists. J.B. Watson in his famous 1913 manifesto claimed that:

> Psychology as the behaviorist views it is a purely objective experimental branch of natural science. Its theoretical goal is the prediction and control of behavior. Introspection forms no essential part of its methods, nor is the scientific value of its data dependent upon the readiness with which they lend themselves to interpretation in terms of consciousness. (Watson, 1913).

Watson thus made it quite clear that introspection and the study of mental processes was notoriously invalid as a scientific method -- this is his strength. He re-

nounced the use of mentalistic terms. In the behaviorist's view the rationalists and the empiricists were to be separated once and for all. Watson equated the phenomenon known as "thinking" with covert behavior chains. Speaking loudly is overt behavior and manifestation of the thought processes. As the volume decreases and dies away this behavior (what is called pure thought) is hidden. Thus, thought is always, for Watson, inhibited covert speech. As such, it is a non observable, non empirical phenomenon and can be ignored.

During the great wave of interest in the new psychology of behaviorism, considerable work was also being done in the area of language and its acquisition. De Laguna emphasized the role of social interaction in language development. She posited that the significance of language arises from the situations in which it occurs and also the behavior which it occasions.

Vygotsky should also be noted. He refuted the idealistic notion that speech, logical thought, memory, etc. are in any sense "innate" or that they "mature" in some way in the absence of social experience. While demonstrating the integral character of thought and speech, Vygotsky (1962) recognized that the two phenomena are by no means identical. Thus Vygotsky addressed himself to the same problem as Watson, but in a more sophisticated way.

B.F. Skinner's theory of language developed out of the productive research of many of these psychologists who attempted to free themselves and their science from a subjective approach to mental phenomena 'through introspection'. While avoiding the crude and narrow behavioristic principles of J.B. Watson, Skinner, adopting a position of radical behaviorism, was able to develop a methodological approach which could cope with the subject matter of the rationalists whilst superseding their theoretical analysis.

Skinner does not ignore private events because there can be no public agreement about their validity. But he raises the question of how much of one's bodily processes, or behavior can actually be observed. Since it does not insist upon truth by agreement as a methodological proposition, radical behaviorism can consider events taking place in a private world within the skin. It does not call these events unobservable or dismiss them as subjective. However, this does not mean that what is felt or introspectively observed exists autonomously or is the cause of behavior (Skinner, 1974).

The main tenet of radical behaviorism is that an organism behaves as it does as a functional response to the changing environment. This is in terms of its structure which is determined by genetic environmental histories. All of "mental life" (so-called) can be ex-

plained by a knowledge of these sources. Through the application of a complex and dynamic series of contingencies of reinforcement, the environment leads to a restructuring of the inner "experience" of its occupants. No adequate account of the development of language or thought is possible without a knowledge of "the hundreds of thousands of occasions upon which a child hears words and sentences spoken or the many thousands of times he himself speaks them with results" (Skinner, 1974). Contingencies of reinforcement operate in the ontogenic histories of individuals to select the behaviors in individual repertoires at any point in time, in much the same way as natural selection accounts for the phylogenetic evolution of entire species. In relation to the development of speech and thought, the contingencies of reinforcement which exert control, without our awareness, are those which have been incorporated over the millenia of human evolution into the particular verbal communities in which individuals reside. These contingencies of reinforcement which affect individual organisms are not stored inside them; they simply change them through educational and other shaping processes.

The explanation of thinking given by Skinner (1953, 1957, 1974) is by far the most complex and subtle theory available. The first and most significant fact about thinking is that, like speech, it is behavior.

More precisely, it is covert behavior (which manifests itself to us primarily in the form of private experience). That it exists as a process is attested to by certain external manifestations, overt activity of one kind or another (for example, verbal report, functional expression in problem-solving activity, egocentric speech; behavior patterns which involve problem solving and covert behavior, inference by analogy from our own experience). Covert behavior is always acquired in overt form.

In thinking, inner speech is substituted for external speech; it is as though the speaker is made the sole listener. Covert behavior has the advantage that we can revoke the behavior without external punishment and try again if private consequences are not reinforcing. In this way, and in several others, it differs from overt behavioral forms. One other significant difference is that thinking is behavior which automatically, and in a uniquely characteristic way affects the behaver. The "speaker" and the "listener" inside the same skin speak and understand the same language in all its nuances. "They" are sensitive to all the resonances of meaning based on common experiences.

Thinking is behaving. It does not explain overt behavior, but is itself simply more behavior to be explained. The mistake of the mentalists is to allocate this form of behavior to some autonomous entity - the

"mind". Thinking has the dimensions of behavior, it is not of some fanciful inner process which finds expression in behavior.

The conceptual model developed for the purpose of the experiment described in this thesis takes its starting point from the radical behaviorist positions, especially of Sechenov, Pavlov and Skinner. In addition, we incorporate a general systems theory assumption which is implicit in the Pavlovian conception of the organism (McLeish, 1955, 1975). Thus we begin from a simplified model which dispenses with the hypothetical entities of the mind, soul or spirit, substituting for them certain methodological concepts as our organising conceptual framework. This is based on six basic principles which have empirical referents: in this way we believe it to be superior to traditional explanations of the thinking process.

Basic Concepts

1. Environmental Control - The so-called higher mental processes are under the control of such features as: (a) the physical environment; (i.e.) such objects as chairs, clocks, coffee cups, etc. and (b) social objects including the individuals in the group, the subject himself, his own body and bodily process, his behavior.

Salient stimuli "emerge" from this environment and "shape" the on-going thought process by controlling mechanisms.

2. Systems Model - Each element, whether physical or social, whether verbal or non-verbal, interacts with every other. Some elements become more salient than others, then merge back to become merely contextual.
3. Dynamic - The environment is constantly changing its form as the organism shifts from object to object, from moment to moment different patterns of elements control and dominate the ongoing process.
4. Reinforcement - Each element in the environment has positive and/or negative aspects for each thinking subject. Thinking is a form of behaviour subject to the contingencies of reinforcement relevant to the behaving subject, to the place and time.
5. The Thought Contingency

   A. Discriminative Stimulus - a discriminative stimulus pattern elicits particular thought content depending on previous contingencies. This stimulus represents an algebraic summation of salient aspects (both positive and negative) in the environment at the particular moment when the thought is "conceived", or when a link is established in the sequence.

B. The Response is in terms of a complex amalgam, or integration of three aspects of the higher mental processes. Any of these may be dominant: (a) the "thinking" aspect, (b) the emotional reaction, and (c) overt behaviour or an "inclination" towards an act.

C. Reinforcement is the sum of the positive and aversive consequences of the particular thought, or sequence of thoughts.

6. Typology - Social stimuli (persons) are reinforcers as are physical objects. Each person in the group (as well as each physical element) has both positive and aversive qualities. It is possible to develop a typology of reinforcers on this basis. (McLeish and Martin, 1975).

CHAPTER II

METHODOLOGY

I. Introduction

A. Background to the Study

The experimental work reported in this thesis is one in a series of research enquiries which have been, and are being, conducted at the University of Alberta under the direction of Professor John McLeish. The overall purpose of these studies is to investigate psychological problems which are especially pertinent to learning and teaching within a systematic scientific framework. Each experiment in this series stands in a vital relationship to its predecessors and its successors, all are done in a naturalistic social situation so set up that subsequent analysis is possible. Consequently, many of the basic arguments, assumptions, hypotheses, and methodological techniques of the present study have been conceived and developed within an "extended family" of empirical studies.

In a more general sense, the Alberta investigations are historically rooted in the tradition of radical behaviorism common to Ivan Sechenov in the nineteenth century and B.F. Skinner in the twentieth. The guiding principle upon which this tradition rests was stated by Sechenov as follows:

> It (psychology) will no longer be based on erroneous reasoning prompted by the misleading voice of consciousness; it will reply on positive facts, on verifiable propositions...In short, psychology will become a positive science.

For the purpose of our work at Alberta, psychology is defined as the objective scientific study of overt human behavior as it occurs in naturalistic settings. One of the common denominators of the experiments in the present series stems from this concern with naturalistic study. The greater part of our experimental data consists of behaviors generated in natural student groups. The normal procedure is to set up a learning situation involving a small number of participants, generally six to twelve in number. We set them a particular learning task under the direction of a leader, while other members of the research team observe the on-going process through a one-way window. The observers are usually engaged in some kind of systematic analysis of the on-going process. In addition, the interaction is recorded on video tape so that a detailed analysis can be made later. Using this general procedure, with appropriate modifications and adjustments, we have studied learning outcomes associated with various kinds of small group interactions, formulated principles of process and structure which affect dynamic group interactions in various ways, operationalized common psychological terms (such as the Freudian ego defence

mechanisms) by equating them with specific behavioral patterns, and evaluated contemporary psychotherapies.

Most recently, we have completed an extensive investigation of verbal behavior, both vocal and non-vocal, as it occurs in the context of the small learning group. The main finding here was that all verbal behavior is under the causal control of tri-member contingencies of reinforcement made up of stimuli in the 'here-and-now' situation. In other words, verbal behavior was found to obey the same basic principles and laws as does the motor behavior of sub-human species in the laboratory researches of Skinner and others. A behavioral model was constructed which satisfactorily explained the variation in the frequencies of the vast majority of verbal behaviors in the groups we observed.

The experiment reported in this thesis was set up in an attempt to ascertain whether the same model, or one analogous to it, can be used to explain and control 'thought behavior' in similar contexts. More generally, we were interested in determining whether thought is a form of behavior subject to the same basic principles which operate to maintain and control other behavioral forms.

B. Basic Assumptions

The science of behavior adheres to certain basic

tenets and assumptions which may or may not be common to other kinds of approaches to behavior. It is the rigorous nature of these assumptions which affords a firm base for empirical investigation. While it is, of course, possible to debate many of these principles from a philosophic standpoint, 'the proof of the pudding is in the eating'. In other words, when consistently applied, these principles go a long way towards explaining that body of data about behavior which interests us. In our work at the University of Alberta, adherence to these tenets has resulted in a good deal of success in dealing with subject matters which have defied other working propositions and presuppositions.

So that there might be no confusion about what the basic assumptions of psychological behaviorism are, they are summarized below. A detailed discussion is not offered at this point, but may be found in McLeish (1963), MacCorquodale and Meehl (1955), and Skinner (1953, 1975).

1. Objectivity - It is possible to ascertain through the development and use of special techniques of observation, the objective realities of human behavior. The observation of these objective realities and subsequent description of them must not go beyond the empirical data.

2. Parsimony - the fewest number of constructs

and the simplest explanation necessary to account for the essential aspects of the behavior being studied is the best.

3. Causality - Human behavior is causally determined. It is possible by using the appropriate techniques, to discover cause and effect relationships in this area. An effect follows from a cause, and does not occur in the absence of that cause.

4. Functionalism - The meaning of any human behavior is to be found in the association it has with the total stimulus situations which precede and follow it.

In addition to these four basic assumptions of radical behaviorism, a number of secondary assumptions have been substantiated by our experimental work to date. These may be seen as corollaries of the first four, being natural extensions of those statements. However, the extensions here, are not simply logical or philosophical, but stand up to the empirical test as well. Like those four already mentioned, these secondary assumptions have a long history. They may be found, explicitly or implicitly in the work of scientists such as Sechenov, Charles Darwin, B.F. Skinner, and Ivan Pavlov.

1. Evolution - Man as a species represents the highest form of physiological development.

Given this development and origin, his behavior is subject to natural laws no less than the behaviors of other animals. Both individual and species are products of a process of natural selection which involves an adaptation to an external environment.

2. External Forces - The so-called 'inner processes' of the human organism develop from and are maintained by external physical, social, cultural, and historical forces.

3. Naturalistic Setting and Systems - Any human behavior must be looked upon in relation to the position it occupies in the entire 'life-system' of the individual who emits it. The life-system includes various subsystems such as the present situation and its physical properties, the past history of the behaving individual, and other contemporary environments and situations in which the individual is embedded. If a total understanding of behavior is to be obtained all the manifest components of the situations in which humans behave must be considered.

4. Validity of Behavioral Laws - The model of behavior elaborated by Pavlov and Skinner can be applied validly to human behavior.

5. Contingencies of Reinforcement - Any temporal sequence of human behaviors and associated environmental stimuli can be most effectively scrutinized in terms of contingency or operant patterns.

C. Hypotheses and Model of Thought Behavior

In the present experiment, the assumptions of principles just described are employed in an experimental test of two central hypotheses: 1. Thought is a form of behavior subject to laws similar to those which explain and maintain motor (Skinner, 1953), and verbal behavior (Skinner, 1953, 1974; McLeish and Martin, 1975). 2. An understanding of behavioral laws and scientific principles can have specific therapeutic value.

The second hypothesis encompasses the idea that an understanding of the variables which control human behavior can, by itself, facilitate a modification of undesireable behaviors, in that it is possible for an individual to apply his knowledge of the causal relations supporting his own behavior patterns in such a way as to restructure the systems of reinforcements and discriminative stimulations to which he is subject. If this hypothesis is true, the process of thought (in its cognitive form of 'understanding' and comprehension) would seem to exert a causal influence on other forms of behavior (i.e. overt

behaviors which are undesireable).

The first hypothesis implicitly supposes a particular model of the thought process. This model is based on the assumption, already recognized, that the so-called 'inner processes' of the human organism develop from and are maintained by external physical, social, cultural, and historical forces. The only difference between 'inner-processes' and public behaviors such as vocalizations and gestures, is that the former are 'covert' (inaccessible to the direct observation of others) and the latter are 'overt' (directly observable by others). Moreover, this difference, rather than being one of quality, is primarily one of quantity. In other words, the intensities and strengths of particular behaviors are weakened (either by punishing consequences or stimulus deprivation or economy) until they cease to be maintained in overt form as of overt, public behavior. Thus they become covert. The raison d'être of covert inner behavior is found in lawful behavioral contingencies.

From a functional standpoint, the model assumes that thought behavior is part of a total response unit which contains both overt and covert parts. Whatever elicits, or stimulates or reinforces the overt part of the total response unit, elicits, stimulates and reinforces the covert part. Thought is influenced in a like-manner by external observable variables, and is part of the same

causal chain.

The conception of thought as part of a total behavioral system which includes associated overt behaviors is, as we shall see, crucial to the methodologies which we have developed to test our two hypotheses. The first hypothesis, in particular is a test of this model. This hypothesis is an integral part of the second hypothesis. If the first hypothesis is valid, the test of its validity should go some way towards establishing the second one as well. It is conceivable that a real understanding of the causal relations, associated with the subjects' dysfunctional behaviors only developed towards the end of what was, in reality, a brief experiment. There was no attempt actually to use contingencies and reinforcement with deliberation to alter behavior patterns.

II. Description of the Experiment

The subjects in the experiment consisted of five graduate students in Educational Psychology and one research assistant in that same department. These six individuals were selected because of their familiarity with the principles, assumptions, and literature of behaviorism, and their association with previous experiments in the series. Two instructors, acting as participants and experimental supervisors, brought the total number of those involved to eight. Responsibility for

planning and conducting the experimental sessions was carried primarily by the instructors, although both made extensive use of student inputs.

The experiment itself was conducted in group meetings of all participants, dyadic interviews between each subject and one or other of the instructors, and private individual exercise sessions. The structures, formats and contents of the meetings, interviews and individual sessions were adapted from a method of investigating the nature and development of creative design skills first formulated by E. Matchett (1968). By superimposing the assumptions of psychological behaviorism, especially that of contingencies of reinforcement, onto the framework supplied by Matchett's Fundamental Design Method, the investigators hoped to achieve a synthesis of pertinent theoretical and empirical information with a tested methodological procedure, which would optimize student performance. Such an effect would ideally throw light upon the validity of falsehood or the two central experimental hypotheses.

Before turning to a detailed summary of the experimental program, the reader should be alerted to the fact that this experiment was set up, not as a definitive

investigation of the thought process, but as a pilot-run aimed at developing methodologies, models and insights which could be implemented in a later, more controlled experiment of larger and rigorous design. Thus, the analyses and results reported in the later chapters of the thesis are not intended to be more than indications of vital causal connections. Limitation due to flaws in experimental design and oversights are pointed out as the occasion arises. The main goal of the present work is to come to grips with what actually occurred during, and as a result of, this initial pilot design, and to formulate a program for a more sophisticated and complete study of the thought process at a later date.

With these reservations in mind, the present study might be structurally epitomized as follows:

1. The Beginning (April 30)

Prior to the first group discussion, participants were met individually to ascertain their interest in becoming involved in the project. At this time they were told that the purpose of the experiment was two-fold: (i) to determine whether or not "thought processes" are forms of behavior, subject to laws similar to those which explain and maintain verbal behavior and (ii) to test the hypothesis that a good understanding of behavioral laws and scientific principles

can have specific therapeutic value. Each individual was informed that the time commitment required would be from eight to ten hours a week, to be divided equally between group or dyadic activities and individual exercises. All six individuals interviewed expressed an interest in the project. Since all of these were adjudged to be relatively stable and were known to have had previous exposure to behavioral principles and scientific method, we felt fortunate in obtaining such a sample.

2. First Group Session (Tuesday, April 30)

The first group session was spent in recapitulating basic assumptions and in outlining the set of principles which form the framework within which the experiment was to be conducted. Participants were urged to accept these tenets and to make use of them in their project activities. The notions of contingencies of reinforcement, functionalism, fundamental design method, systems, dynamic movement, behaviorism, analysis, and interaction were recapitulated briefly. Participants were urged to become "experimenters" in this new area of inquiry and tomake use of these fundamental principles in developing methods appropriate to a disciplined examination of the "thought process". To facilitate both specificity and motivation the participants were urged to outline at least ten "intellectual" (academic) activities in which

they were engaged and to select one of these that might be improved. Having done this, the "task" was to isolate a particular problem area associated with this one general activity and to define its behavioral manifestations in terms of observable behaviors if possible. This problem was to become the focus for the thought exercises which lay ahead. It was hoped that some improvement in this area would result from a careful and controlled analysis of the thought behavior associated with the problem. The problem selected was to be of sincere concern, to be readily identifiable and yet not so specific that it failed to arise in a variety of circumstances. The participants were expected to select a problem and to begin daily half-hour thought exercises immediately. The half hour periods were initially to be used in identifying specific methods of applying the basic principles of psychological behaviorism to an understanding of the sources of "thought" in the immediate environment. Two handouts were given at this time: (i) "Systems, Models, Simulations and Games in Education: A Description and Bibliography", by John McLeish , (1969) and (ii) Fundamental Design Method, by E. Matchett (1968) (taken from The

Accelerated Development of Creative Mental Skills).

3. First Set of Dyadic Interviews (May 1 and 2)

Each participant was asked to recapitulate his or her method of choosing a problem area from 10 intellectual activities. In some cases suitable problems had already been chosen; in others, one was eventually determined during the interview. Participants were then encouraged to identify specific situations in which this selected problem arose, and to identify the different systems in which they were involved. The starting point for an attempted systems analysis was to be the "here-and-now" system in which the half hour exercises were carried out. Participants were encouraged to do these exercises at the same time of day and in the same place. The routine suggested was to think about the problem, to relate such thought to the environment (starting with the relatively simple here-and-now system and then extend it to other interlocking systems). Eventually a consideration of the individual subject's "history of contingencies of reinforcement" was urged. It was further suggested that those processes which might inhibit or facilitate the problem in terms of identified contingencies in the form of a systems analysis should be the goal of the exercise.

4. Second Group Session (Friday, May 3)

The basic concepts of reinforcement, functionalism, dynamics and systems were once again highlighted. Special emphasis was given to a detailed delineation of the systems approach to thought analysis. Each participant was given the opportunity of relating his or her experience with the daily half-hour thought exercises - the specific methods each member had employed became the focus of discussion. Various approaches to the actual mechanics of the individual exercises were discussed, with students being encouraged to adopt more analytical and "atomistic" methods. A very short period of time (5 sec.) was suggested for a "free thought" period, the rest of the exercise time being used to analyze systematically, the thought content obtained during this brief time. The session ended with a discussion about the possible explanatory nature of "inner processes", and the relationship of contingencies of reinforcement to the systems approach. Finally, two brief handouts were distributed dealing with the basic assumptions underlying the experimental design and the systems approach to thought analysis.

5. Viewing of the Videotape (May 3 and 6)

After the second group session it was decided that some input into the development of methodologies

aimed at analyzing the thought process might be gained by viewing the videotape recording of that session. The specific task involved an attempt, by the participants (three or four members only of the group) engaged in this activity, to recall those thoughts they were experiencing at different stages of the group discussion and to relate these to the total group environment. Both instructors and three students took part in two such exercises. Unfortunately, it was discovered that the students had very little ability to reconstruct their past thought processes.

6. Individual Interviews (May 6 - 9)

This phase of the project was less structured than earlier phases. Participants were requested to come in for dyadic interviews on a daily basis if at all possible. Two students adopted this schedule; the rest were interviewed more spasmodically. The primary purposes of this set of interviews were to develop more sophisticated and productive methods of thought analysis (especially in the half-hour exercises) and to obtain specific feedback from each of the participants. Basic principles were rehashed and suggestions for improvement made. The following excerpts from audio recordings of interviews stress most of the main ideas expressed at this time.

1. Link the association of "ideas" with objects

in the immediate environment.

2. Try charting out, on paper, the flow of the thought sequence.
3. Recognize salient objects in the environment which might interact to produce a "here-and-now" system.
4. One possibility is to limit the stimuli from the external environment - for example, by blindfolding - and concentrate on the other types of stimulation remaining.
5. It is difficult simultaneously to write down things and to think. A very short "think session" followed by a written analysis is better.
6. Feelings and perceptions are also to be considered, for the purpose of this experiment. Thought is any inner process we are aware of.
7. Mostly, association of "ideas" obscures the influence of the environment on thoughts.
8. Focus should be on changes in the thought themes. When these shifts occur, they should be recognized, recorded and associated with objects in the "here-and-now" system which become salient at the time of these changes.
9. Use concentric-circle systems diagrams to

facilitate system analysis, the inner circles enclosing the more salient objects or thoughts, the outer circles the less salient.

10. Concentrate on reinforcing stimuli. But remember that not all behavior is reinforced, some behavior patterns may be punished or extinguished.
11. Concentrate on thinking and your problem area will come up quite naturally.

At the end of this period students were still having difficulty in two major ways:

1. An inability to extrapolate their theoretical knowledge to the thought exercises.
2. An inability to relate the project problem to the thought analysis techniques.

Another handout was distributed at this time - an excerpt entitled "Thought as Behavior" from B.F. Skinner's Verbal Behavior (1957).

7. Third Group Session (Friday, May 10)

The third meeting of the participants as a group was very informal, and was structured to facilitate a greater amount of student involvement. Participants exchanged ideas and findings related to the methods they had been using, indicating the strengths and weaknesses

of various stragegies. Specific thoughts from the half-hour exercise periods were cited and functional explanations postulated. Working principles and assumptions were discussed in this context. The last part of the session was taken up by a demonstration of the techniques of the "thought exercise" by one of the instructors. The demonstration consisted of a five second "free thought" period. This was followed by a verbal charting of the chain of "inner events". A hypothetical explanation using a "systems" and "contingency of reinforcement" approach, was then attempted. The students were then invited to attempt their own functional analysis of the instructor's thought process. The response to this modelling was encouraging and the demonstration itself seemed to clarify notions about what was to be considered a unit of thought and what "inner processes" count as thought.

8. Individual Interviews (May 13 and 14)

During this series of interviews the participants began to show definite insights into the project as a whole. Questions such as "What counts as thought?" and "What is the best unit of thought for analysis?" began to be intelligently considered and dealt with. However many difficulties still remained in terms of the application of the analysis - difficulty in relating thought

exercises to problem areas, failure to pick up reinforcing stimuli, inability to deal with punishment and extinction, etc. In order that the thought exercises and subsequent analyses might be more concrete and immediate for both participants and instructors, the interviews at this time consisted of attempts to do the thought exercises in the context of the dyadic interview situation itself. This seemed to be more profitable in terms of both anxiety reduction and productivity.

9. Fourth Group Session (Wednesday, May 15)

The fourth group session was very informal and consisted of an extension of the "on-the-spot" thought exercises which had begun to represent the format of the dyadic interviews. During an initial orientation phase, participants were encouraged to record their thoughts for brief periods at any time during the group session. The group activity then consisted of individual thought reports and ensuing discussions and analyses of those thought contents which involved both instructors and participants. The informality of the session and the specificity with which systems analyses could be conducted appeared beneficial to task production. Reinforcing stimuli were dealt with, patterns of contingencies were considered and a new method for study of "spontaneous thought" was advocated. The latter involved the idea of studying the

thoughts which occur prior to beginning the exercises and "going blank", rather than those occurring after such initial attempts and frustrations.

10. Individual Debriefing Sessions (June 14 - June 20)

After a break of one month, some of the participants were interviewed for a final time. They were asked to relate their own assessments of the six week's experiment in relation to the two hypotheses. There was general agreement that the method of studying prior thoughts was superior to the method of examining post thoughts. The former methods was said to give a better example of spontaneous thought.

Some concern was expressed about the lack of rigid methodologies which the participants had employed in carrying out their tasks. Various techniques were suggested which would allow for better controls.

Most of the students felt that they were better able to understand their problems, and also better able to manipulate undesireable behaviors. The first hypothesis also received a vote of confirmation. The subjective feeling of the participants was that thought behaviors could be understood from a behavioristic position.

11. Fifth Group Session (June 20)

This was an informal session in which students were given a final opportunity to express their views on the experimental hypotheses. While there was considerable support for the hypothesis that thought processes are forms of behavior subject to the basic principles which apply to other forms of behavior, there was less agreement that an understanding of behavioral laws and principles had specific therapeutic value. Several participants remarked that their problems seemed less important to them than they had originally imagined. Some felt that the exercises and discussions had given them deeper understanding of their own behavior and moods. A more concentrated and extensive experimental period was suggested as one way of overcoming many of the difficulties encountered in the present experiment.

CHAPTER III

THE ANALYSES

A. The Test of the First Hypothesis

The first hypothesis was to the effect that thought is a form of behavior subject to laws similar to those which explain verbal behavior. More specifically, this means that the occurrence of thought behaviors is determined by contingencies of reinforcements (discriminative stimuli, responses and reinforcements) which can be recognized by the experimenter.

Behavioral scientists have long been familiar with the laws of reinforcement, extinction, punishment, shaping, discrimination and generalization which control the motor responses of sub-human species. In the seventies, a number of independent studies (cf. McGinnies and Ferster, 1971; McLeish and Martin, 1975) have empirically shown that the same principles, with only slight modification if any, have explanatory power for the verbal (both vocal and non-vocal) communications of human subjects. Concomitant with this generalisation of these laws from motor to verbal behavior, has been a shift in emphasis from rigidly controlled laboratory settings to human social contexts. The method of naturalistic observation has found a place in the laboratory as well as in the field. While various methodological refinements have

been necessitated by this change of scene, the rules and assumptions of psychological behaviorism stated earlier, remain basically unchanged.

The present experiment was designed to provide an initial test of the first hypothesis. In so doing, it paves the way for a more definitive test in the future. In a sense, the experiment was intended as a 'brain-storming' enterprise which would determine in rather a 'loose' fashion whether it was possible to conceptualize thought in the behavioral paradigm. Consequently, much of what will be reported in relation to the first hypothesis is prima facie in nature and depends to some extend on hypothetical constructs which do not meet the requirements of rigorous research. While this may be somewhat disconcerting for those of us who adopt a scientific stance towards reality, it is unavoidable at this stage in attempting to work legitimately in a difficult research area. Before definitive research can be attempted, the scientist must first formulate questions in the proper way. Such is the aim of this part of the present experiment.

With these points in mind, it must nonetheless be emphasized that even pioneering research of this type is different from the subjective introspective method. Unlike introspective experiments, the present study is not regarded as being an end in itself. Its overall purpose

is to work towards the establishment of a basic corpus of information which can be empirically investigated. The hypothetical constructs used are not antithetical to scientific explanation since they are not posited in lieu of existing knowledge, and because their existential properties are manifestly stated. Further, the working assumptions employed are extrapolated from an established body of facts accumulated in reference to motor and verbal behavior. The basic requirement for a legitimate use of hypothetical constructs is that the reader be warned of their existence. Thus, the promulgation of pseudo-explanations of the phenomenon under investigation, which might be based on this initial research study, are forestalled.

To counter-act the effects of hypothetical, speculative inputs, a more controlled analysis was attempted. The methodology used was an extension of the McLeish and Martin verbal behavior methodology - the difference being that the subject matter in this case is thought behavior; more precisely, verbal behavior which reports internal thought episodes.

The data for the analysis were obtained from the video-tapes of the fourth group session. In this session the participants were required to report thought exercises carried on during this group session. The video-tape thus affords the possibility of a detailed

situational analysis of the actual thought episodes, the immediately succeeding verbal accounts, and the ensuing group discussions.

In their report on verbal behavior, McLeish and Martin made use of a functional system of interaction analysis to code all the verbal behaviors of all group participants during every second of interaction time. A computer analysis of the coded behavioral sequences then determined the contingencies of reinforcement which changed or maintained the emission frequencies of particular verbal forms. In 439 cases of such fluctuations, McLeish and Martin were able to account for 404 on the basis of tri-member contingencies revealed by their analysis.

To determine whether or not a similar behavioral framework supports the occurrence of thought behaviors, the McLeish and Martin methodologies were applied to the thought episodes recorded in the fourth group session. Since thought behaviors are, of course, not directly observable, our analysis relies heavily on the validity of the subject's verbal report of his internal activity. This report followed directly on the actual thought episode. By superimposing the subject's subsequent account of his thought behavior onto the actual period of the thought episode, the thought process was placed within its proper stimulus context and the associated

overt behaviors were also observed. A functional analysis of the behavioral and stimulus patterns thus recorded enables us to test our second hypothesis in the same way as McLeish and Martin tested their hypothesis about verbal behavior.

Our procedure thus consisted of coding the subjects' verbal reports of their internal activities during the thought exercise periods, and comparing these codes with those code operants which epitomized the overall social situation in which the thought exercises were actually embedded. All codings were done in terms of the Verbal Operant Coding System (McLeish and Martin, 1975 - see p 53 - 54). To facilitate this comparison, detailed systems diagrams were constructed. These clearly outlined the salient stimulus objects and behaviors in the 'here-and-now' systems in which the exercises took place.

Unfortunately, this attempt to replicate, on a small-scale, the McLeish and Martin methodologies in the thought modality met with serious difficulties. In addition to the rather tenuous assumption that the subjects would be able verbally to reproduce an accurate account of their internal activity during the exercise periods, the time dimension and the behavioral unit in the thought modality are not the same as those found in the analysis of verbal behaviors. Thoughts occur at an amazing speed. They are often truncated and sometimes

obscured by other simultaneous sensations and perceptions. More will be said of these problems later.

A criterion level had to be set up to evaluate the data obtained by this comparison procedure. Thus if the coded operants of the verbal reports, when superimposed on the overall social situation in which the actual thought occurred, presented a significant increase in the number of externally coded operants we would consider this supportive of our first hypothesis. In otherwords, the number of self-stimulated echoics and intraverbals coded by a simple analysis of the verbal report had to decrease.

RESULTS I

This chapter reports the results of the hypothesis of the environmental thought contingency analysis, namely, that thought is a form of behavior subject to laws similar to those which explain and maintain motor and verbal behavior. That is to say, particular thoughts are determined by environmental controls, in particular, by contingencies of reinforcements and discriminative stimuli active in the "here-and-now" situation.

The main data used were obtained from the videotape of the fourth of a series of five discussion sessions related to thought and the thought exercises. These are supplemented from other reports of dyadic interviews and other group sessions.

The subjects involved were graduate students in the educational psychology department, as well as two instructors. Group meetings, dyadic interviews between each subject and one of the instructors and individual private thought exercises were used to guide and train the subjects to recognize their thoughts, to record their thought units and to link these to discriminative (eliciting) stimuli and reinforcements.

In their private thought exercises, subjects were asked to think "freely" for several seconds and then to chart out on paper the order and flow of thoughts

that had occurred during that brief time. Any salient objects or changes in the environment, whether perceived auditorially, visually or kinesthetically during the thought period, were then to be recorded (eg. a clock in the room started the subject thinking of an appointment the next day). Any changes in the thought themes were especially to be noted and where possible, identified as being associated with particular intrusions from the environment (eg. the ringing of the phone).

Examinations of thought content and possible related salient environmental influences were discussed in the dyadic interviews between the individual subjects and one or other of the experimenters. These acted as training sessions to help the subjects 'understand' particular contingencies of reinforcement. In many instances it was possible to identify only part of the tri-member sequence. Occasionally, and more frequently as training progressed, the discriminating stimulus, response and reinforcement became recognizable.

Several examples from the taped interviews follow:

One subject, Casey stated that in trying to do his thought exercises at home that day he had tried to gain some 'insight' into his problem of feeling "anxious" and "uptight" when called upon to speak in a group.

Casey: I tried to think of past situations where I had been uptight... you know, earlier ones...athletic competitions with huge crowds. When I was swimming, competition was keen and I was anxious...conditioned to feel anxious with large unknown crowds. Ah... there's less competition in academic situations but...crowds of strangers...

Experimenter: This reflection on past events...is this what is meant by trying to study the situation functionally? How different from psychoanalysis?

Casey: Aw...I see the stimulus situation as competitive, environment and crowd. The response is nervousness and anxiety. And aw...reinforcement is aw...vague. Winning involved.

Experimenter: Spend time on the 'here-and-now'. For example, why did you think of swimming just now? Stimulus in this room?

Casey: (I) looked out the window, saw sports field...guys running, so competition. When I was younger I swam competitively.

Casey: I was putting a tape on the tape recorder (at home) and it acted as a stimulus to get me on to my thought exercise.

Experimenter: Was this just an extended tact from tapes? We are taping during the thought exercise (sessions)?

Casey: It...No. It was a feeling...aw, noise of traffic outside my room and tape on and confusion...all this noise and agitation. This noise was the stimulus and I thought

'confusion' and lecturer (experimenter) saying it was my turn (to talk).

So, I jumped from 'tape' to 'thinking of session' to 'get on with job'

Jennifer: I was thinking about my problem...you know, that I find it difficult to listen attentively to someone and retain the train of thought I want to use when it's my turn to talk... And I thought, 'What are the elements in this?' Maybe I'm just not interested...

Experimenter: Where were you when you had this thought that maybe you weren't interested? Do you remember the exact moment?

Jennifer: Yes...walking over the boardwalk out of the new building over to the Students' Union...and I thought, "sometimes I'm bored".

Experimenter: Did you have the thought 'boredom' first and 'boardwalk' second?

Jennifer: I never connected them: I was just thinking as I walked that some of it (my problem) was boredom. I tried to expand later on and could 'see' this image of the place where I first had the thought.

Experimenter: Was this a pun? Bored? Board?

Jennifer: No...No. Boardwalk - Monopoly. Boardwalk and Lexington.

Experimenter: Monopoly <u>board</u>?

Jennifer: No: Boardwalk and promenade and strutting...and I was pleased with myself. So I was strutting.

This practice was put to use during the fourth session of the group discussion series, when thought exercises were carried out by three individuals during the otherwise normal flow of conversation in the room. Each subject thought, - noted, and then verbally presented his flow of ideas from the period of time (four - ten seconds) when he had "withdrawn" from active listening and participating in the conversation going on around him. A discussion and analysis of these "on-the-spot" thought exercises and reports was then indulged in by the three "thinkers" and the rest of the group.

This whole session, like all the others in the series, was recorded on video-tape. A detailed word-for-word transcript was made of the complete fourth session. The exact time when each individual did his particular exercise was observed by noting "withdrawal" from group participation, loss of eye contact and subsequent note making on individual note paper provided. These periods were also verified verbally by each "thinker" during the session and confirmed again by some of the subjects watching a re-run of the tape.

In this study thought is treated as behavior, believing as Skinner (1957) claimed, that:

> thought is not a mystical cause or precursor of action, or an inaccessible ritual, but action itself, subject to analysis with the concepts and techniques of the natural sciences, and ultimately to be accounted for in terms of controlling variables.

In this experiment the flow of thoughts, as related by each subject, was lifted from the transcript and broken into a series of thought units. As an initial approximation the thought unit was defined analogously to Bales' (1970) single interaction unit, that is, "the smallest discernible segment of verbal or non-verbal behavior to which the observer can assign a classification under conditions of continuous serial scoring". Normally this is equivalent to "a simple phrase".

These thought units were then examined in the light of a systems model which was constructed to indicate as exactly as possible the complex system of "signal" objects present in the immediate environment for each individual during his few seconds thinking time (see Appendix Social System Diagram). This consisted of:

1. The salient physical objects in the seminar room including:
   (a) seating positions of the persons in room
   (b) permanent objects close to the table and subjects eg. coffee cups, pens etc. on table top,
   (c) clothing - colors, designs, textures
   (d) permanent objects away from the table, eg. doors, clock, televising equipment etc.

2. The non vocal gestures and vocal minutiae occurring during each exercise:
   - this included hand gestures, table tapping, writing activities, nodding and shifting, throat clearing, cigarette smoking, etc. by all members in the group.
3. The vocal themes, in order of occurrence, by everyone who spoke during the time each subject was thinking.

The thought units were examined and classified according to the Verbal Operant Coding System (Martin-McLeish, 1973) which is based on Skinner's verbal operant descriptions (1957). Skinner recognized several verbal classes and described probable contingencies of reinforcement through which these might be acquired and maintained: such contingencies are embedded in the particular verbal community to which each individual speaker and listener belongs. Verbal behavior is defined as behavior which is reinforced by its effect on people, listeners as well as self. Thought behavior is a special form of the latter.

The five verbal operant classifications used to code the thought units were:

1. Mand - a verbal operant in which the response is normally reinforced by a characteristic consequence and is therefore under the functional control

of relevant conditions of deprivation or aversive stimulation.

2. Tact - a verbal operant in which a response of given form is evoked (or at least strengthened) by the physical presence of a particular object, or event, or property of an object or event.

3. Extended Tact - a verbal operant in which a response is generated by physical properties of objects and events, and the association between verbal behaviors and the physical properties are not commonly reinforced by a particular verbal community.

4. Echoic - a verbal operant in which the response is under the control of verbal stimuli such that the response has formal properties precisely the same as the stimulus.

5. Intraverbal - a verbal operant in which the response is thematically related, but shows no point-to-point correspondence to the verbal stimulus.

This functional system of interaction analysis was applied to the thought episodes as related in the

fourth group session.

These thought behaviors were coded and considered not as isolated streams of words, but in relation to the observable qualities existing in the immediate environment at the specific time the thinking occurred in the hope that through a functional analysis we could indicate that the majority of each subject's thoughts were a response to, and were controlled by, the particular physical and verbal environment surrounding each subject at the time he was thinking. This was done through a "time-lag" procedure whereby the vocal minutiae, non-vocal gestures and physical space present during each thought-episode were superimposed on the verbal report to generate a kind of systems matrix. By embedding each subject's verbal account of his or her covert behaviors into the appropriate environmental complex, the covert thought processes were placed in their proper stimulus contexts. The behaviors associated with the reported thought helped to "objectify" the thought content.

Thought Exercise One: Fourth Session

Consider this portion of the reported thought sequences of one of the subjects.

> "The stimulus that started me off was the pen with University of Alberta...ah, that led me to think about the University of New England...in Australia. And then for some reason, I thought about summer".

Without any knowledge of the situation in which the reported thought sequence actually occurred, we could break this down into the following thought units.

pen - U of A - U of N E - summer

and explain each:

pen is a tact: a response evoked by the physical presence of this particular object

U of A: an extended tact
a response generated by the physical object (pen) and extended possibly to a broader association (a writing implement used during lectures)

U of N E: an intraverbal
a response thematically related to U of A but not showing complete point-to-point correspondence to the original stimuli.

summer: again an intraverbal thematically linked to the previous thought and dependent to some extent on the individual's own personal history.

These were interesting but supplied very few point-to-point correspondences with an external stimulus.

Upon questioning, this trained thinker could

add several more thought units between University of New England and summer. These were:

pen - U of A - U of N E - beautiful - green -

- sunny - summer

'beautiful', 'green' and 'sunny' were coded as intraverbals, thematically linked to each other and explained as self stimulated "internal" associations. (see Table 2, column 2). But after these same units of thought were subjected to a more detailed analysis and superimposed on the physical and social dimension present at the same time as the thoughts were occurring, a somewhat different explanation was available. One which depended much more heavily on an external causal relationship than on a self stimulated mentalistic, covert explanation:

pen - tact again - physically present in the environment.

U of A - tact - the words are written on this particular pen and the group session was situated on the university campus.

U of N E - extended tact - a response generated by the presence of the words U of A and extended to a broader association with another university.

beautiful	- intraverbal	- thematic association by individual "private" experience at the U of N E.
green	- extended tact	- from green chairs present in the room (confirmed by the thinker when questioned)
	- intraverbal	- salient because thematically associated with previous thoughts
sunny	- intraverbal	- associated with green and also external extended tact from
	external extended tact	- the actual sun shining outside that morning
summer	- internal intraverbal	- connection with sunny but also extended tact from presence
	extended tact	- in room of another subject who had discussed summer with the thinker just previously.

Thus when looking carefully for a possible causal connection between the various thoughts, reported by an individual, the operants appeared to be influenced by more than just internal thematically linked intraverbals in the private modality.

As seen in Table 2, the proportion of intraverbal and echoic responses was much larger when the Verbal Operant Coding System (VOCS) was applied without a time

TABLE 2

Thought Units	Without Superimposing Physical Space	Superimposing Physical Space/ Time-Lag Methods
pen	tact	tact
U of A	extended tact	tact
U of N E	intraverbal	extended tact
beautiful	intraverbal	intraverbal
green	intraverbal	extended tact & intraverbal
sunny	intraverbal	extended tact & intraverbal
summer	intraverbal	extended tact & intraverbal echoic

lag. The classifications relied on logic, as well as associations with other thought units in the same reported sequence. Thus only an internal (I) explanation seemed possible because knowledge of the total environment was not available. In contrast, the time lag system increased the proportion of mands, tacts and extended tacts coded and allowed many (supposed) "internal" echoics and intraverbals to then be coded externally (E) because they were functionally related to the verbalizations of other group members during the course of the "free-thinking" periods.

Thought Exercise Two: Fourth Session

Consider the following reported series of thoughts:

editing - not doing task - blank - TV - teaching - classroom - professor going on and on

Without a time lag a functional analysis is forced to code most of this chain of thinking as internally stimulated. (Table 3 column 2).

By going a step further and superimposing the actual conversation going at the very time the subject was doing his thinking we see the infringement of the environment on this flow of thoughts:

editing - becomes an echoic because at the very time that this sub-

ject was thinking another person in the room was saying "don't hold thoughts back, don't edit...they are editing for themselves".

not doing task - becomes echoic (E), the person insisting on the task being done was present (tact E) and speaking of 'not doing the task' echoic (E) and the subject was thematically connecting the editing without doing task (intraverbal I)

blank - appears to be removal of aversive stimulus - from presence of task master (tact E), as well as an intraverbal (I).

T.V. - remains a tact (E) from the physical presence of the video-recording TV monitor in the room, as well as an intraverbal (I).

teaching - is an echoic as the discussion at this time had turned to comments about teaching -

"Much like teaching...different from behaviors of teaching itself".

classroom - while still an intraverbal (I) from the teaching association, also becomes an extended tact from the discussion and classroom like situation

professor going on and on - remains an extended tact from the professor's presence in the room, an internal intraverbal from the association with a classroom and an external intraverbal from the professor actually speaking "on and on" at that time.

Thus through a careful examination of all possible observed conditions existing in the immediate environment of the thinker at the precise time of the thinking the greater number of the thought sequences appeared to be stimulated by an external, or an external and internal, rather than simply an internal controlling "mechanism".

TABLE 3

Thought Units	Without Time Lag	With Time Lag
"editing"	intraverbal (I)	echoic (E)
not doing task	extended tact (I)	echoic (E) intraverbal (I) tact (E)
blank	intraverbal (I)	tact (E) intraverbal (I)
T.V.	tact (E) intraverbal (I)	tact (E) intraverbal (I)
"teaching"	intraverbal (I)	echoic (E)
classroom	intraverbal (I)	ex tact (E) intraverbal (I)
professor going on and on	ex tact (E) intraverbal (I)	ex tact (E) intraverbal (I) intraverbal (E)

Thought Exercise Three: Fourth Session

The third subject reported the following thought sequences:

forcemeat - meat hanging in shop - mother - kind of cut - joke - ladies present - unclothed - meat

While this example is perhaps not as dramatic as the previous two, the time lag analysis does supplement several of the thought units which would otherwise have been coded simply as intraverbals. (See Table 4).

forcemeat - becomes an echoic (E) because when this line of thought was occurring a speaker in the room was saying "Without force in that direction". Also it remains an intraverbal because of the forcemeat connection from childhood visits to the butcher shop.

meat hanging - remains an intraverbal as well as becoming an echoic (I) - repeating his own previous thought of 'meat'.

mother - remains unexplained and thus still an interverbal (I).

kind of cut - extended tact (I) from meat

TABLE 4

Though Units	Without Time Lag	With Time Lag
forcemeat	intraverbal (I)	echoic (E) intraverbal (I)
meat hanging in Shop	intraverbal (I) echoic (I)	intraverbal (I) echoic (I)
mother	intraverbal (I)	intraverbal (I)
kind of cut	intraverbal (I)	intraverbal (I) extended tact (I)
joke	intraverbal (I)	extended tact (E) intraverbal (I)
ladies present	tact (E) intraverbal (I)	tact (E) intraverbal (I)
unclothed	extended tact (E)	extended tact (E)
meat	intraverbal (I)	extended tact (E) echoic (I)

association.

joke - extended tact (E) from subject in room to whom he had told the meat shop joke the previous day, as well as intraverbal association (I) thematically connected with the butcher.

ladies present - a tact (E) from the ladies present in the room at the moment and intraverbal (I) linked with the dirty joke.

unclothed - extended tact from ladies who at the moment were clothed.

meat - extended tact from females as 'meat' and internal echoic from repetition of his own prior thought unit of 'meat'.

Again more detailed knowledge of the physical and social environment surrounding the thinker throws light on causal links between the external objects and activities in the situation and the content of the thoughts.

Our percentages of external and internal explanations of thought for the three subjects in this particular experiment using the time lag method are shown in Table 5.

TABLE 5

	External Only	Internal Only	Both	Total
Subject 1	70%	11%	19%	100%
Subject 2	41%	26%	33%	100%
Subject 3	58%	5%	37%	100%
Average	56.88%	14%	29.66%	100%

The diverse results reported in the two columns of Table 6 reflect the dichotomy of internal (self) versus external stimulation. The vast majority of the reported thought units which were scored without the time-lag procedure were self-stimulated echoics and intraverbals, a breakdown congruent with the idea of man stimulating himself independently of any external contingency control. Conversely, the results of the time-lag analysis, which considered report thought units in relation to the situations in which the thoughts actually occurred, are congruent with the basic paradigm of operant behavior. Of the time-lag codes, 54% were tacts or extended tacts which were stimulated and reinforced by physical properties in the group environment. Without the time-lag procedure only 7% were tacts and extended tacts. Thus our criterion level for accepting the first hypothesis was met.

The main point is that when thought events are analyzed without reference to the environment in which they actually occur, internal thematic links between various thought units are the only functional relationships available. Thought becomes an autonomous, self-stimulating process. When the same thought units are studied with a knowledge of the environmental properties active during their initial emissions, functional relationships between thoughts and external stimuli are readily discerned. The time-lag codings attests to the more objective nature of this latter method of analysis.

TABLE 6

Percentage Breakdown of VOCS codings with and without Time-Lag Procedure*

	Without Time-Lag	With Time-Lag
Mand	3	3
Tact	4	26
Extended Tact	3	28
Echoic	19	14
Intraverbal	71	29
Total	100	100

* A total of 74 reported thought units were coded.

The most prevalent of the recurring patterns of operants found in the thought analysis of all three thinkers was that of an external tact (or extended tact) being followed by another external extended tact and an intraverbal. This is illustrated in the following example:

> One subject stated that the humming of the TV recording equipment in the room stimulated her to report the thought "airplane". This follows the common pattern of

Tact	⟶	Extended Tact	⟶	Intraverbal
(TV equipment)		(other motors make similar noises)		(this hum (TV) 'reminds' me of that hum (plane))

The tact is our direct contact with the environment. The frequent use of tacts as a "take off" point for thoughts has been illustrated in this study. There is nothing particularly novel about this demonstration except the fact that it happens much more frequently than we imagine. The reinforcement here appears to lie, not in the establishment of the recognition of a similar object by a listener as is the case when using verbal tacts, but in establishing and expanding on an association within the thinker's personal "intrathoughtal" community.

The extended tact permits an extension from the physical stimulus (tact) into the privately san-

ctioned community of intraverbal associations. Thus thematic relationships (or internal intraverbals) can become extremely complex because of each individuals' prior history of experience. Thematic responses are oftenchained together (Pavlov's "dynamic stereotypes"). Each may serve as a reinforcement for the previous thought while at the same time acting as the discriminative stimulus for the succeeding thought. This process is prone to constant interruption from the environment. These interruptions break the thematic association and begin a new cycle. The intraverbals reinforce the tact-extended tact operants. If the intraverbals are punishing, "blank" periods may occur and break the "flow of thoughts". So salient external stimuli (the phone rings) or internal stimuli (pain strikes) and/or aversive intraverbals may serve to break the operant chaining. The operant chains represent the earlier ("personal") contingencies of reinforcement ("the unique experience of each individual"). The first thing our experiment has demonstrated is that these earlier contingencies are not nearly so numerous, nor so effective, as they are imagined to be. We were constantly impressed by the fact that what seemed to be rare and exotic thought contents reduced themselves to rather banal associations to objects in the here-and-now environment as a result of our analysis.

Since all forms of behavior serve a function

which relates to the situation which precedes it and the consequences which follow it, according to our model, so too must thought. In order to explain thought as behavior we must have as complete a description as possible of the total physical and social environment that accompanies it. This study has brought thought as a form of behavior closer to being understood because a methodology has been proposed which helps to determine the controlling elements in the environment surrounding the act of thinking. These verbal reports of thought contents have been analysed by the "time-lag" method so that the covert behaviors can be explained as objective data causally related to preceding and succeeding stimuli. Thus they are explained more parsimoniously than previous studies have allowed.

We concluded, it is possible to determine in the majority of instances, a causal connection between the thoughts of an individual (as reported by him verbally immediately following the thinking) and the preceding and accompanying objects and activities in the "thinker's" immediate environment.

B. The Test of the Second Hypothesis

The second hypothesis to be tested in the experiment was that an 'understanding' of behavioral laws and scientific principles has specific therapeutic value. The word 'therapeutic' implies a movement from disruptive or maladaptive behavioral forms to more adaptive and acceptable forms of behavior. A criterion of such behavioral change is the frequency with which defined behavioral operants are manifested. Accepting the validity of behavioral laws and the concept of contingencies of reinforcement, any increase or decrease in the frequency of the particular patterns must be controlled by environmental stimuli. If a disruptive behavior pattern decreases in the course of the experiment, such a change will qualify as therapeutic. Conversely, any increase in frequency of the same behavior must be considered anti-therapeutic. Moreover, the environmental stimuli which control such changes (if they occur) can be discovered by a scrutiny of the total behavioral context in which these changes occur.

Such an empirical test does, of course, require that suitable data be available. These data must be in the form of objectively recognizable behaviors recorded on a time dimension. In addition, the stimulus contexts in which these behaviors are embedded must be accurately and parsimoniously delineated. Ideally, the data should

be obtained from a naturalistic setting so that the principles of "meaningfulness-in-context" and of 'systems' are not violated.

Our usual method of acquiring data is to record on video-tape the group interactions which constitute the focus of our investigation. The preservation of the actual behaviors and the contexts in which they occur is vital if our studies are to be reliable and valid. By recording the group sessions in the present experiment, we obtained a permanent record which forms the basis for the empirical analyses presented.

Once in the possession of such data, the experimenter's task is to recognize behaviors which either support or refute the declared hypotheses, working on the basis of the principles of objectivity and parsimony. The behavioral data can be directly and simply linked to the theoretical questions which are being asked in this way.

This is not as easy as it sounds, since the untrained observer is in the habit of surrounding his descriptions of events with interpretations, mentalistic explanations, and emotional reactions. Often these hypothetical constructs (mentalistic constructions in particular) obscure the objective facts of the event as it actually occurs, separate from our own hopes, aspirations, and biases. A second difficulty is that we

often, unwittingly, focus our observations on only a part of the phenomenon, and neglect other aspects which may be crucial to an understanding of that phenomenon. A common example of this error is the way in which we habitually pay attention to vocal behavior, and neglect its non-vocal accompaniment. Scientific observation is not an easy skill, and the members of our research team have spent hundreds of hours in observational training.

A similar difficulty occurs in attempting operationally to define a behavioral difficulty. In the present study, the participants were unable to formulate the behavioral problems which they hoped to solve in a manner appropriate to empirical analysis. For example, a male subject in the experiment described his difficulty as 'an uncomfortable feeling when asked to speak in the presence of a group of people'. While such a description satisfies the requirements of normal social discourse, it is not satisfactory from a scientific point of view. From the participant's statement it would be impossible to identify particular sequences of behavior which compromise his difficulty. If a behavioral analysis of the therapeutic effect of our experimental program was to be forthcoming, the problem areas selected by the participants had to be operationally defined in behavioral terms so that they could be reliably coded and their manifestation studied.

Thus, a method of operationalization was required before our test of the second hypothesis could get off the ground. Since we were especially interested (particularly in relation to the first hypothesis) in troublesome 'thought' behaviors, such operationalization presented a good deal of difficulty. In the final analysis, the question became whether or not it was possible to find patterns of overt behavior which were indicative of the internal problems posited by our subjects. If our initial model of the thought process was correct, at least some overt part of the total response which comprised a particular thought sequence should be capable of objective recognition. This possibility was strengthened by our concern that the problems selected by the participants should be appropriate to group discussion, such as we wished to record. In other words, we sought to select only problems which arose in group situations.

Many of the techniques of operationalization eventually used had formerly been tested in an earlier experiment in the series. This set out to define behaviorally the nature of the Freudian ego-defence mechanisms. Ideally stated, this procedure may be summarized as follows:

1. The experimental behavior (in this case 'problem') is identified on the video-tapes by a panel of qualified judges, or by the group

members in association with behavioral specialists. This initial procedure is somewhat 'subjective', and the interpretations of the group members normally exceed empirically verifiable limits.

2. The taped sequences identified in the first step are thoroughly observed with the aid of a 'behavior observation system' which transcribes the behavior into numbers corresponding to several well-defined catagories of behavior.

3. The numbers so generated are scanned for similarities and differences using behavior sequences which have been previously identified as homogeneous.

4. If the numeric behavioral strings which discriminate such sequences are found, these are checked for reliability and validity by the group members, judges, and specialists.

These steps need to be repeated several times before specific behavioral criteria can be formulated. Sometimes, of course, this is impossible since the criteria formulated in step 1 may remain too vague and amorphous. The operationalization procedure usually fails when the construct we are attempting to define is too general in scope, or overlaps with other constructs. Throughout the operationalization procedure,

reliability checks are made between the various observers and coders. Validity is controlled by comparing experimenters with subjects or with specialists. In order that the specific behavior pattern should not be taken out of its total social context, the simultaneous behaviors of other group members, as well as the preceding and succeeding group behaviors are coded using the same behavioral observation system.

Surprisingly enough, the methodological difficulties which had been anticipated as a consequence of employing 'thought' as a subject-matter proved to be no greater than those encountered with the Freudian defense mechanism and other common psychological concepts. These two conceptual systems are based on mentalistic notions validated by introspective evaluations which lack pragmatic observability. Consequently, one is no less troublesome than the other. The truth of the matter is that many branches of psychology employ some form of 'mind-reading' as their principal modus operandi.

The behavioral observational system devised for the present study codes very discrete and specific behaviors. It is not an all-encompassing system of interaction analysis such as Bales (1950, 1970), or Flanders (1971). Its chief aim is not to discover group phase movements and role differentiations, but to summarize succintly the objective behavioral realities of group

interactions at specific points in time. It consists of significant group behaviors defined in common, everyday English. The coded behaviors are listed in Table 1. A key identifying the participants in the experiment is also included.

Once the coding system had been worked out, the five video-tapes were viewed for occurrences of the specific behaviors characteristic of the participant's 'problematic behavior'. The entire set of tapes was viewed twice for each participant by two trained observers. The occurrence of the symptomatic behaviors was recorded on a time chart, one for each participant. During a particular 'problem' sequence for one individual, the behaviors of all the participants were coded.

The validity of the hypothesis that an understanding of behavioral laws and scientific principles can have specific therapeutic effect was assessed on the basis of increases or decreases in the emission rates of problematic behaviors. Group behaviors which proceded, accompanied, or succeeded 'problem' sequences were analyzed in tri-member contingency sequences. These sequences are a demonstration of the efficiency of particular behavioral events in eliciting and reinforcing the experimental behavior patterns in question.

RESULTS II

This chapter reports the results of hypothesis II, namely that a subject's knowledge of behavioral principles has specific therapeutic value for him.

The data were collected from video-tapes of five discussion sessions lasting approximately one hour each. Six subjects participated in the experiment. The group also included a leader who prepared and presented discussion material. There was also a secondary resource person, Jim, who played a major role in directing and guiding the subjects throughout the experiment.

The video-tapes of each session were viewed in detail many times. With an awareness of each subject's stated problem, he alone was observed and coded. When an instance of more than five seconds of apparently dysfunctional behavior was observed the time of this occurrence and its duration was noted. Preceding and succeeding behaviors in the whole group were also noted, e.g. who was speaking at the time the dysfunctional behavior occurred.

The results are presented separately for each person in a session-by-session description of the individual's dysfunctional activities with special reference to any tri-member sequences that re-occur. A general, more interpretative account follows commenting on each subject's patterns of behavior and his possible therapeutic movement

throughout the whole experiment.

Time charts are included (Appendix A). These incorporate the collected data for each person in each session. This material is presented in a tri-member sequence manner. Three columns appear on each time chart. The left hand column lists apparently salient stimuli which are manifest immediately prior to the subject's coded dysfunctional behavior (response). The response is shown in graph form in column two, followed in the third column by a reference to the activity which occurs as the subject discontinues his dysfunctional activity.

Finally, each session is described with reference to all the subjects together in the group. The prevailing mood, topics of discussion and general interaction during each hourly period are also recorded.

Subject: CASEY

Problem:

Casey stated that he felt self-conscious and embarrassed when he was asked or expected to speak in a group. It was most apparent prior to, and in the initial stages of speaking. It was more prevalent in intellectual situations because there was "no necessity to perform in social situations". Casey said his self consciousness and embarrassment were manifested by feeling "very uptight", "flushed" and "rushed" "especially during the initial stages of delivery". The discomfort was accompanied by an "incredibly increased pulse rate".

Coding:

Attention was given to Casey's behavior prior to and during speaking times, particularly when he knew ahead of time that he would be called upon to speak. Changes in general posture, avoidance of eye contact with the speaker, anxiety expressed in fidgeting, shifting and rubbing and a "rushed" speaking pattern were watched for.

Session 1

Twenty-one sequences, representing 16% of the total session time, were coded as manifestations in overt

behavior of Casey's "self-consciousness".

The majority of the coded sequences (15) were characterized by general fidgeting, intermittent attention to the speaker and/or the group and rocking or rubbing motions.

On several other occasions (6), there was marked lack of eye contact with the speaker and lack of attentive orientation. A head-down position was common.

At mid point in the session the leader asked the group to volunteer comments. Casey immediately lowered his eyes to the table and wrote on his papers shuffling them about. This was followed by a head-down rocking motion which ceased when the leader got a response from someone else. The rocking began again as the leader presented another point, stopping when Casey himself asked a question. The leader did not reply directly to him but made some joking comment which evoked general laughter in which Casey did not join.

Casey spoke again at fifty minutes, accompanied by fidgeting and finger tapping. The session ended with the leader speaking directly to Casey who displayed a head-down, shifting position while listening. The most frequent tri-member sequence occurring this session was:

leader speaking → Casey's loss of eye contact and fidgeting → leader or Jim speaking about task

The longest dysfunctional behavioral period can be summarized as follows:

leader speaking directly to Casey → Casey with head down and fidgeting → leader still speaking directly to Casey

Session 2

Seventeen sequences, representing 23% of the session time were coded as manifestations of "self-consciousness".

The majority of these sequences (12) were lack of orientation to the speaker and/or a head down position often holding his head in his hands. There were fewer (5) instances of fidgeting, hand tapping and nose rubbing than in the first session. However, these later nervous activities were very pronounced during Casey's own speaking sequences.

Casey began this session with his head in his hands, moving a hand to his mouth frequently. At eight minutes the leader asked for a response from anyone in the group. Casey moved in his chair, rubbed his ear and gazed off until another individual responded. The responder's introductory remarks caused group movement and laughter (tension release) in which Casey did not participate. Casey then began a period of almost ten minutes of dysfunctional behavior as he realized he would be called upon to speak to the group in turn. Casey sat with head

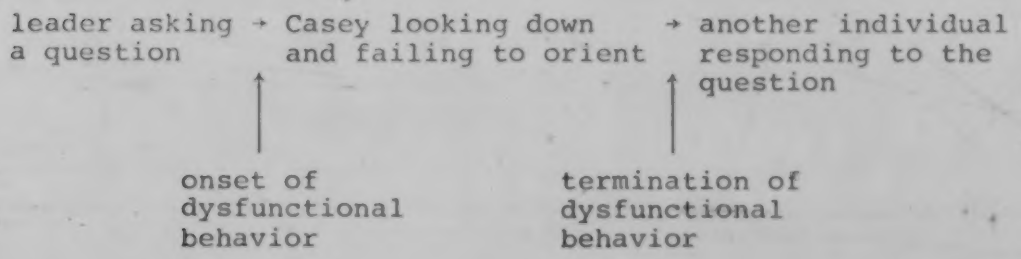
and eyes down and did not orient to any of the speakers during this time.

When Casey was called upon to talk about his problem he began hesitantly. As he spoke he engaged in a great deal of body movement, he shrugged his shoulders and rubbed his hands on the table with intermittent finger tapping. He generally gazed down while speaking. The hand motion ceased as soon as Casey stopped talking and another individual was called upon. This is the same pattern of behavior that had been displayed in session one by Casey after a question had been put to the group.

Casey then shifted in his chair, laughed, moved his shoulders and generally seemed much more relaxed. He joined in group laughter after this point.

There was still some inattentiveness as others in the group made their contributions. When queries were put to the group as a whole Casey avoided eye contact with the leader and frequently rubbed his nose or arm. He seemed particularly fidgety when Dave was speaking. Casey spoke a second time (at 40 mins.). This was self initiated as he asked for clarification of a point by the leader. No apparent anxiety proceeded this. However, during his speaking his hand moved in an upright position and there was some nose rubbing and later, finger tapping. Casey lost attention again as the session drew to a close, orienting only when a reference was made to the audio-

visual equipment and as Jim responded to a question from Dave. During this time his head and eyes were turned down and he did not orient to group members as they spoke. The most common tri-member sequence in session two for Casey was:


leader asking a question
Casey looking down and failing to orient
another individual responding to the question
onset of dysfunctional behavior
termination of dysfunctional behavior

Session 3

Ten sequences were coded as manifestation of "self consciousness" and 6% of the time was coded as dysfunctional behavior.

This session opened with an informal atmosphere. Several people had cups of coffee and were speaking causually as the taping began. Casey appeared relaxed, he oriented well the first few minutes and sat with his hands in his lap.

Casey spoke spontaneously on a number of occasions this session. There was no apparent anxiety prior to or during these speaking instances. Some slight scratching sometimes followed his speaking.

Towards the end of the session Casey stared at a particular coffee mug on the table and then made a

reference to Jim's insession thought exercise, wondering if this cup could have been a salient stimulus. The leader dismissed this suggestion (punishment to Casey) and he then turned away completely for several minutes with his head hung down and some shifting about in his chair. A later reference by the leader to this reprimand evoked a spontaneous comment from Casey and increased awareness.

Generally, this was a good session for Casey. He was not expected to speak out, his inattentive periods were shorter and he displayed less fidgeting and body movement. He was still rather slow in much of his orienting. Several short spontaneous comments did not seem to be preceded by "self conscious" behavior. The most common tri-member sequence this session was:

another individual speaking → Casey not orienting → other individuals speaking or being spoken to

Session 4

Fourteen sequences manifesting self consciousness were coded. 16% of the time dysfunctional behavior was evidenced.

In this session each subject was expected to do an in-session exercise and explain it to the group. Casey appeared relaxed and spoke jokingly with the group as the session began. The task for this session was explained and at four and a half minutes Casey withdrew legitimately

from participation and did his thought exercise for eight minutes. There were a few brief periods of attention during this time but generally he was looking down, writing and concentrating on the paper in front of him.

Casey did not orient frequently to Jim who was playing the role of leader this session, except to give brief eye contact at the mention of several key task words - e.g. "stimulus deprivation", "intraverbal" and "extinction". These words appeared to be salient stimuli eliciting attentive behavior from Casey. He easily answered a direct question put to him by Jim. However, he continued to fidget and to give most of his attention to his own task and the sheets of paper in front of him. This continued until the recital of his own exercise. He glanced away when interrupted but continued with his report. His hand movements were relatively subdued when speaking compared to the activity displayed in session one. He frequently looked up and then down at his notes. Casey relaxed considerably after his speech.

There is another heavy period of inattention towards the end of the session. When Wendy, who was sitting between the leader and Casey was asked a number of direct questions, Casey looked up as responses or comments were made but gazed down each time another question was fired often rubbing his nose or ear with his hand. This pattern of looking down when questions

were posed to the group occurred over and over with Casey. Most frequent tri-member sequence this session was:

question asked → Casey drops eyes and head → someone else responds

Session 5 Casey was absent.

General:

Casey appeared to lose eye contact a great deal during the sessions. At these times he sat well back from the table with his head down. During his eye contact, attentive times he did some fidgeting and shifting in his seat. He usually had his eyes downcast when speaking.

There were several instances of "spontaneous" speaking (especially in session three) which were not preceded by apparent "self conscious" behaviors. However, these situations were not those in which Casey said his problem was located. It was when he was asked a question or was otherwise expected to speak that he felt embarrassed. Certainly when he knew ahead of time that he would be called upon there was a very apparent buildup of anxiety. This was shown in session one when each individual was called up on to state his problem and again in session four when everyone had to do an "on-the-spot" exercise and then relate it.

Casey was quite able to identify and define his

problem precisely but seemed unable to control overt manifestations of behavior associated with it. He continued throughout the sessions to be pestered by this "self-consciousness" prior to an expected speaking instance.

Casey's dysfunctional behavior was at its peak in session two when it reached 23%, almost one quarter of the session time. It was on this occasion that he knew he would be called upon, as were all the subjects, to tell about the problem he had chosen to work on during the experiment. His dysfunctional behavior increased more and more as his turn approached. It disappeared almost completely immediately he finished his speech.

The two sessions, two and four, where Casey had anticipated being called on to speak had the longest average times per sequence of dysfunctional (withdrawn) behavior.

Casey was quick to drop his head or lose eye contact when a question was put to the group. In this way he generally avoided being asked a question directly, especially by one of the leaders. Even when another subject was being questioned directly, Casey avoided orientation to them or to the questioner.

Many of the occasions when Casey returned his attention to the group seemed to be stimulated by task oriented words - eg. "reinforcement" "stimulus deprivation". This concern for the task is also evidenced by the type

of clarification questions he asked.

More sessions would be required before one could say Casey was making progress with his problem. His fidgeting and tapping while speaking decreased between two and four but he continued to have a build-up of anxiety prior to an expected speaking turn. Casey was absent for the last session.

Subject: ORMA

Problem:

Orma's selected problem was her strong inhibition to writing letters.

A secondary problem appeared to be her poor comprehension of English and subsequent difficulty in communicating with others in English.

Orma made the following statements when speaking about her problem during her interview.

> I'm poor in writing". "I'm very scared of writing term papers". "I always-my mind made me heavier to writing". "I'm very single minded". "I have a trouble in expression, writing especially, I always put it off".

Coding:

Orma's stated problem was not one which would be manifest specifically during the experiment, because there were no written assignments. However, it seemed closely related to her overall problem in communicating verbally - she said she had "trouble in expression, writing especially". Thus, in coding Orma her communicating or speaking times were especially observed. Relative stimuli prior to her speaking and those in effect as she concluded a statement were noted to see if there were aversive factors that might inhibit her communication. Thematic consistencies, or lack of these, were also looked for as possible in-

dicators of her ability to comprehend and communicate in English.

Coding was difficult because:

a) the subject's sitting posture was always very immobile

b) the subject chose to sit with her back to the camera in all but one session (#4).

Session 1

1% of the session time was coded as dysfunctional behavior. This was in two short instances.

Orma's normal sitting position was quite immobile. This was maintained throughout the session with slight eye and head orientation to the various speakers. Orma did not make any contribution when the group as a whole was addressed. In one instance she was asked by the leader if she had any questions but did not respond vocally. She giggled rather inanely and smiled blandly. Near the end of the session Orma's single speaking incident occurred when she asked an irrelevant question.

Session 2

14% of this session's time was coded as dysfunctional behavior. This accumulated over six instances.

In this session there were four occasions when

Orma did not orient to a new speaker. These were 30 - 60 second periods when several different individuals were speaking. However, the greater part of her dysfunctional behavior occurred in three sequences of two-three minutes duration each. Orma spoke during two of these long sessions in a very run-on anecdotal style. The rambling stories were somewhat disconnected although points related occasionally to the general theme. The group was generally attentive and patient while she spoke but she was finally interrupted by the leader on one occasion, and by the conclusion of the session on the other.

Session 3

8% of this session was coded as dysfunctional behavior. All of this occurred during Orma's five speaking instances.

Orma maintained her usual static position during the first quarter hour of the session. She then responded when addressed by the leader but did not laugh with the group following the leader's joke. During the next four speaking times she rambled on about personal incidents that were vaguely connected to the group theme or task. Twice she interrupted other speakers to begin her own vocalization and on four out of five speaking occasions the leader interrupted her in order to force a conclusion to her speech. This tri-member sequence is repeated frequently throughout

this session:

leader speaking → Orma interrupting (thematically inconsistant, fidgeting and obsessive vocalization) → leader interrupting

Session 4

39% of the session was coded as dysfunctional behavior. One period of over five minutes and another of over eight minutes contributed largely to this sum.

Early in the session Orma spoke, again it seemed unrelated to the subject matter being discussed. However, Jim responded to her comments and she spoke again within a few minutes, addressing herself to Jim. He cut her off shortly. There were no further speaking attempts until the very end of the hour when the leader asked her a question. She responded, but again was thematically inconsistent and rambled vaguely. She was cut off by the ending of the tape and thus the session. Orma had two extremely long periods of dysfunctional behavior not connected with speaking instances. The first long period (almost six minutes) occurred in the first quarter of the session immediately following the leader's expressed annoyance with her. She slips into a period of no orientation to speakers in the group, no participation in group laughter, and a head-down position leaning away from the leader. This is followed, mid session, by a second, even longer (eight minutes) period of withdrawal from the group.

Again there was a staring-off with lack of orientation, failure to join group laughter, and a leaning away position from the two group leaders. This seemed to be a very unhappy session for Orma. Her speaking attempts were thwarted by the leaders and she spent a large percentage of the discussion period apparently out of contact with the group. The two frequent tri-member sequences were:

Jim speaking → Orma speaking (thematically inconsistant) → Leader or Jim interrupting

leader or Jim speaking to other individual → Orma not orienting, head down → laughter

Session 5

7% of the session was coded as dysfunctional. This time Orma appeared attentive and oriented her eyes and head well. She did not attempt to speak until the very end of the session when she was approached by the leader with a question. She excused herself and left the room for a minute and a half. On her return she was again questioned and responded this time. Once more she was off the subject, leaned away from the leaders awkwardly and engaged in obsessive ranblings and was finally cut off by the leader. However, her coded dysfunctional behavior decreased to 7% this time. A great decline from session four at 39%. Orma's single speech

for this session was again interrupted by the leader and by the ending of the session.

General:

Orma's normal sitting posture is erect but static. This is quite likely a culturally conditioned, (Oriental), socially accepted, female listening stance. Eye contact and slight head orientation were possible from this position and were generally evident during most of the sessions.

In almost every instance when Orma was coded as displaying dysfunctional behavior she was attempting to communicate through speech. The other subjects were generally attentive, leaning forward and looking directly at her, during these times. On several occasions people nodded understandingly or even filled in phrases for her while she was relating her anecdotes. However, her sentence structure and pronounciation were poor and she did not contribute much substance to the group discussions. The leader, or the end of the session, interrupted Orma 75% of the time she spoke. This must have been aversive and discouraging to her. The tremendous increase in non-speaking dysfunctional behavior in session four and plain non-speaking behavior in session five could well reflect a response to these interruptive, cutting-off patterns that began to develop toward the end of the third meeting.

There seems no evidence of a therapeutic effect for Orma as she progresses through the sessions. Her dysfunctional behavior fluctuates, going from 1% to 14% to 8% to 39% and down to 7%. Her speaking instances increase to a maximum of five during session three (cut off four times) then drop away again to three times and only once in the final session. Her thematic inconsistency is common throughout all her attempts at verbal communication. The difficulty with writing (her selected problem) is not really challenged in the experiment. The secondary issue of poor English expression appears to remain constant.

Certainly the pattern that appears over and over again for Orma is:

leader asks Orma a question → Orma responds (thematically inconsistent) → leader interrupts

This leads to a decrease in the number of questions the leader puts to Orma. The thematically inconsistent responses become aversive, and are avoided by him. In the meantime, Orma is forced to initiate her own speaking instances by interrupting: she still indulges in excessive ramblings and vocalizations and is once more cut off.

Subject: JENNIFER

Problem:

Jennifer indicated her problem was inattentiveness to the speaker during discussions (especially in a one-to-one academic conversation). Jennifer felt this was because she was overly concerned with formulating her own immediate contribution to the conversation.

Coding:

Consideration was given to coding Jennifer's inattentive behavior.

- Either loss of eye contact with the speaker or group, or slowness in orienting to the speaker, or person spoken to;
- or a head-down inactive position

Thematic inconsistencies were looked for when Jennifer commented or asked questions, hoping to find evidence of missing the point because of her inattentive spells.

Session 1

18% of this session time was coded as inattentiveness. Jennifer had a great number of instances of lack of eye contact with, or lack of orientation to the speaker. This happened most often when the speaker spoke for prolonged periods and/or was the leader. There were several

prolonged periods when Jennifer leaned away from the speaker or the group.

There were three occasions where fidgeting was quite pronounced. Jennifer frequently reached into her handbag which was placed on the floor beside her chair.

The thematic connections throughout this session were good. Sometimes orientation to the speaker was slow. She responded more quickly to Jim's comments than to the leader's.

Jennifer contributed several suggestions, asked for clarification on one or two ideas and generally participated readily. Attentiveness increased toward the end of the discussion period especially after a comment seemed well received by the leader (reinforcement). The most frequent tri-member sequence occurring this session was:

leader's long speech → Jennifer's lack of eye contact → leader's continuing speech

Session 2

In this session Jennifer's coded inattentiveness decreased to 8%.

Jennifer's periods of lack of eye contact fell off this session although there was still considerable fidgeting evidenced by pencil tapping, forehead rubbing and seat wriggling. There was a somewhat prolonged initial period of getting settled. She frequently turned to the

outside person away from the leader.

While reasonably attentive, Jennifer did not participate a great deal this time. The whole group was rather slow moving. Jennifer had her arms spread in front of her on the table for much of the time - a posture which was not repeated in the other sessions. The most frequent tri-member sequence occurring this session was:

leader speaking	→	Jennifer's lack of eye contact	→	leader asking a question or new individual speaking

Session 3

Jennifer's dysfunctional behavior again decreased, this time to 1% of the session time. There was only two coded sequences, one during the first few minutes and the other during the last two minutes. Again there was an initial giggling and hand-bag searching period where her head and eyes were lowered. Jennifer sat in a prominent position, facing the camera where she was easily viewed. Her orientation was fast, she was attentive and laughed appropriately. She emitted a number of nodding, smiling and agreeing motions.

There did not appear to be any thematic inconsistencies in Jennifer's comments, she seemed relaxed as did the whole group. Both short inattentive periods were preceded by one of the instructors speaking.

Session 4

Through a misunderstanding Jennifer was not advised that the group was meeting on this occasion. She came in twenty six minutes late. She expressed surprise with some exaggerated pitch, was offered an explanation and sat down in the empty chair, with her back to the camera, with little fuss.

It was difficult to observe inattentiveness in this position and in fact no problem sequences were coded. Head orientation was very good. Relevant, thematically linked questions were asked, laughter was appropriate and easy and Jennifer responded quickly to questions and made several light hearted jokes. She appeared to behave in a very normal, interested manner.

Session 5

Jennifer's coded inattentiveness was at 2% this time. There was again a general getting settled period. Throughout the hour there was intermittent lack of eye contact with the group. She oriented quickly and appeared attentive although she turned away from the leader on numerous occasions. She was thematically consistent when speaking and participated actively. The most frequent tri-member occurring this session was:

leader speaking	→	Jennifer's lack of eye contact	→	someone asking a question or new member speaking

General:

Jennifer's normal pattern of behavior in these small group seminars was to orient quickly between speaker and listener. When speaking herself she kept her head up and addressed, through eye contact, most of the members of the group.

With the exception of the first session Jennifer showed very little dysfunctional behavior. Her seating positions generally granted ample opportunity for accurate viewing and coding. Jennifer seemed to have an initial period each session of fidgeting before she settled down for the discussion. She responded smoothly and willingly to questions addressed to her and often answered when the group as a whole was questioned. She frequently moved her hands while talking and addressed the whole group when responding or commenting. She often nodded and smiled agreement when other subjects were speaking. Jennifer seemed particularly encouraging to Wendy.

There is a very apparent decrease in Jennifer's dysfunctional behavior as the sessions progress. (Compare graph 1 with graphs 3,4 and 5). Her inattentiveness dropped from 18% in session one to 8% during the second (problem-relating) session then to 1%, 0% and up slightly in the final meeting to 2%. Jennifer's problem seemed to dissipate after it had been identified, (between session 1 and session 2). Certainly a much more normal level of

behavior followed after session one. This could not be accounted for simply on the basis of familiarity with the group as she knew the subjects and particularly the leaders quite well before the experiment began.

Jennifer's inattentive behavior was almost always preceded by a speaking instance by the leader. This pattern occurred three times more frequently than when anyone else was speaking. A change of pace, that is, a question being asked or a new person speaking appeared to be the most common stimulus to return Jennifer's attention to the group. Jennifer suggested during session two that her inattentiveness might be caused by boredom rather than with concern at forming her own forth-coming comments. There seems some evidence to support this as Jennifer withdrew during long speeches by the leader and returned when something new was happening. Her spontaneity and thematic consistency in answering, asking or commenting did not suggest the behavior of a person over-concerned with making an appropriate comment. There appeared to have been considerable therapeutic progress for Jennifer through the duration of the experimental sessions.

Subject: DAVE

Problem:

Dave said he frequently experienced feelings of frustration and impatience in inter-personal dialogue. Dave stated that, "I would hope I didn't show it (impatience) obviously". When feeling impatient he had three choices:

1. "Take control of the situation" (ie. direct the conversation to his liking).
2. "Opt out of it" (ie., withdraw to an inner state away from the frustrating situation).
3. "What I tend to do most often ... is adopt a posture where I watch what's happening and let it try and run its course. I try to pay attention to where it's going and see if there's another point where I'm not frustrated any more and where I feel I can plug in. This may be a way of postponing either a control endeavor or opting out.

My "choice most often is to listen but not participate - kind of see if something is going to come around that I believe is worth hearing".

Coding:

While coding Dave, attention was given to his lack of participation in the group - generally by loss of

eye contact, or lack of orientation to the speaker, and his indications of irritability through shifting or shrugging. Particular activities or speaking patterns immediately prior to Dave's comments and participation in the group were looked at. Interruptions and cutting comments might be common for Dave if he was trying to change the subject or speaker. Fidgeting and body restlessness are frequent reactions to impatience and frustration - these were watched for and coded.

Session 1

Fourteen sequences representing 14% of the session time were coded as dysfunctional behavior. These instances consisted primarily of lack of eye contact with the speaker, or person spoken to, and were generally accompanied by a head down, arms folded across the chest posture.

Dave had a number of intermittent periods of inattentiveness during the first session most frequently during the leader's long speeches. These introductory remarks were of an explanatory nature, in this case reviewing behavioral principles that Dave would already have been familiar with. Dave's second most frequent incident of lack of eye contact was following the asking of a question by one of the other subjects. Generally, Dave became attentive again as one of the leaders responded

to these questions even though he had not oriented well when questions or responses were presented by his fellow subjects. The occasions when Dave did return eye contact during the leaders' continuing speeches were usually punctuated with key task words, eg. "behavior patterns", "project", "task". They appeared to be salient stimuli to Dave because they referred to the experiment and exercises that the subjects were involved in, because, immediately following their utterance Dave returned to an attentive stance. The most frequent tri-member sequence occurring this session was:

leader speaking	→	Dave, head down and fidgeting	→	leader speaking task words

Session 2

During this session, twenty sequences, representing 11% of the time, were coded as impatience and frustration. During the leader's introductory remarks there were several short instances when Dave gazed away. Dave was more attentive as a new speaker entered the scene (Wendy), but there was periodic loss of eye contact and orientation as the dialogue continued. Dave was with the group as they laughed, added a spontaneous comment and then made his major speech. He appeared less interested as other subjects related their chosen problems, (eg. Casey and Jennifer) for the thought experiment. Again, Dave

seems to give more attention to the two leaders especially Jim, as he initiates a comment, than to his fellow subjects. However, even if Dave was not looking at the group he seemed cognizant of what was going on and attended quickly whenever he or the group was presented with a question. Non-vocal orientations from the leader were responded to quickly. Dave was very responsive when asked for a contribution. Again the majority (eleven out of twenty) of times when Dave lost eye contact were during the leader's long speaking sessions. However, he responded quickly when the leader (four times) oriented toward him and paused, giving Dave a chance to speak. The two frequent tri-member sequences here were:

leader speaking → loss of eye contact → leader orients to Dave

other subject speaking → fidgeting → leader or Jim responding

Session 3

Ten inattentive sequences were coded, composing 9% of the session time.

This session began informally without a long introduction by the leader. Dave was attentive and smoked his pipe. There were a number of short conversations and comments which held his attention. Dave frequently sat back in his chair with a knee-up position. This seemed a

normal listening posture. He asked questions of others in the group and attended to their responses more this session. He was often reinforcing to others with comments or nods. Again Dave responded very effectively to the frequent non-vocal and vocal questions that were presented to him by the leader. During long speeches, Dave sat back with his head down or else engaged in a rubbing motion on his nose or mustache. He became attentive much more often during short conversations than during long speeches but oriented very quickly when a conclusion or question was imminent. The most frequent tri-member sequence was:

leader speaking → loss of eye contact and fidgeting → leader questioning or orienting to Dave

Session 4

Dave was absent.

Session 5

Six instances of dysfunctional behavior were noted, totalling 3% of the session time.

Dave was generally attentive this session. He seemed particularly responsive to discussion at an abstract level and made many of his contributions in this area as well. Dave appeared very sensitive to the group mood in-spite of his frequent leaning back, head-down posture.

He oriented quickly to group laughter, and his responses were always thematically linked. Loss of eye contact and poor orientation were minimal during this session and no significant tri-member sequences seemed evident.

General:

Dave was generally fairly attentive and responsive throughout the sessions. (Percentage of total time coded as dysfunctional was 37%). During his lack of eye contact and poor orientation (fidgeting) periods he frequently sat or leaned back in his chair with his head down and his arms crossed over his chest. Nevertheless, Dave's quick and thematically consistent responses indicated that he was more perceptive than his posture would suggest. Dave's own description of his usual way of behaving in a group situation seemed to fit his performance.

Dave generally "turned off" during the leader's lengthy speeches. However, he also responded most frequently during the leader's speaking time. These responses ("awakenings") usually occurred as the leader was concluding a speech and/or glanced in Dave's direction. This orientation to Dave was very effective in regaining his attention and served as well to reinforce the leader. It might be wise to note that the leader spoke the most frequently of anyone in any given session. Dave seemed less interested in the comments or questions of his fellow

subjects than in what the leaders had to contribute. (Perhaps he deemed one contribution more relevant than the other and thus more reinforcing). Dave's lack of interest was evidenced by the occurrence of his fidgeting periods. The greater part of the time when Dave was rubbing his nose or mustache, or when he was wriggling about in his seat occurred when one of his fellow subjects was posing a question or making a response. On the few occasions where he appeared restless when either the leader or Jim was speaking, they were speaking at length or they were addressing, not the group as a whole, but specifically one individual in a dialogue situation. It was when new information was contributed by one of the leaders that Dave appeared interested again.

Shorter conversations appeared to hold Dave's attention, as did more abstract, theoretical discussions. This was particularly evident in the fifth session.

Dave had a steady drop in the percentage of time coded as dysfunctional behavior during each session - from 14% to 11% - to 9% to 3%. This represents a consistent decrease. Dave responded negatively to familiar references and repetition. He responded positively to attention - from the leaders. This often appeared as non-vocal reinforcement for Dave. He picked it up and responded to it quickly. There seemed to be a definite increase in Dave's attentive behavior as the sessions

progressed. This is most marked towards the end of session two and throughout session three as the leader orients more frequently towards Dave and thus appears to grant and receive reinforcement for an exchange of ideas. This pattern of rewarding must be satisfying to Dave, thereby removing many of his feelings of frustration and impatience. This increased attention from the leader seems to correspond with a decrease in dysfunctional activity by Dave.

Subject: WENDY

Problem:

Wendy stated she was reluctant to speak, especially to begin to speak, in an academic or authoritarian situation.

Coding:

Attention was given to the following behaviors, or combinations of behaviors.

(1) mouth opening without uttering words,
(2) abrupt hand gestures, waving or pointing,
(3) sudden shiftings of position especially forward movements,
(4) strong nods of agreement without speaking,
(5) attempts to interject, interrupt or mumbles.

Session 1

Wendy virtually did not talk during the first group session although she had four periods of minimal responses. She responded with an "ok" when asked to pass cigarettes. And she had three sequences of responding to a direct question by nodding and saying, "umhum". There are five occasions when Wendy made unsuccessful attempts to add a comment. These occurred as the leader was speaking or pausing in his speech. Generally he continued and overrode her, ignoring her forward movements and

sudden gestures with her hand.

Session 2

Wendy's efforts to participate increased during the second session. At nine minutes she responded to a direct question and spent almost four minutes (with intermittent urging) relating her chosen problem and discussing her initial thought exercises.

Wendy was not called upon to speak again although she made eight attempts, generally by moving forward with some animation and gesturing with her hands. During this session she tried to interject when some of the other subjects were speaking as opposed to when the leader was holding the floor. However, even if noticed, her gestures were not strong enough, or persistent enough to be successful and the leader, or Jim or both of them were instrumental in over riding.

Wendy's attempts to speak were consistently punished.

Session 3

Wendy participated more frequently and successfully during the third group session. Out of a total of fifteen speaking instances she initiated eight, three of these were social aside comments, two were interruptive statements, and three were simply thematic contributions

to the conversation. Five other times Wendy tried to comment by leaning forward, mumbling, or moving her hands, but faded away as someone else, again usually the leader or Jim took over the conversation. There was a consistent punishment contingency. Her attempted speaking instances were unrecognized and Jim or the leader continued to speak over her.

Session 4

During this meeting Wendy spoke 17% of the time. This was her most vocal session although she did not speak at all during the first twenty-six minutes prior to the late entry of Jennifer to the group. However she made one attempted move to comment earlier on by leaning forward and moving her hand as Jim asked the group a question but the leader came in with the answer. Wendy made a further attempt just before she was called on to relate her own thinking exercise sequence. She tried to break in vocally when Jim said "trying to break out of the punishment" but Jim continued overriding her.

During her allotted speaking time Wendy initiated several comments and carried on successfully several times after being interrupted. She laughed on a number of occasions and seemed more relaxed and comfortable than during the previous sessions.

Session 5

Wendy's attempts to speak increased but she was still not very successful. Her mumbles did not turn into audible contributions. She made two efforts to comment when Jennifer was speaking (this may have seemed a safe place to try to interject because Jennifer often reinforced Wendy's efforts) however, someone else was always faster at replying. On eight more occasions Wendy tried, sometimes maintaining a controlling hand gesture for some time but was always overridden. Half of these times she tried to make a comment when other subjects were involved in short dialogues with the leader or Jim. But the latter two always maintained control. Wendy even tried during a couple of brief pauses to enter the conversation but to no avail. Her behavior was not as easily extinguished as in session one but eventually she gave up. Even her nodding, agreeing behavior diminished when she was not acknowledged.

General

Wendy was a quiet but attentive member of the experimental group. She listened carefully but usually only responded when asked for a contribution. After Wendy identified her problem (reluctance to begin speaking) in session two, she increased her attempts to make spontaneous comments in the group. Unfortunately, these were

seldom recognized by the others and she was not strong enough or persistent enough to gain control.

Her attempts were most frequently punished by the leader and/or Jim. This resulted in a pattern of punishment and her attempts decreased toward the end of each session.

However, she progressed from only speaking when spoken to in session one to making ten attempts to interject in session five.

This indicates considerable improvement for Wendy. A slight set back in session five was concentrated in the last fifteen minutes when Jim and the leader (her main punishers) were attempting to sum up the complete experiment. Their desire to be profound in the concluding minutes of the last session was perhaps too much for Wendy even with her new found skill.

The most frequent tri-member sequence for Wendy during all the sessions was:

Brief pause → Wendy attempts to speak → Leader or Jim overrides her.

The percentage of Wendy's successes in speaking out (other than in response to being specifically addressed) compared to her unsuccessful attempts, increased over the sessions from 0% → 13% → 50% → 71% → 71%.

Subject: PAM

Problem:

Pam stated her problem as being a serious aversion to numbers. Anything mathematical caused her great anxiety.

Coding:

Pam was dropped from the analysis because:

(1) she was present for only three out of five sessions.

(2) she had no private audio-taped interviews about her thinking exercises.

(3) she was off the TV screen a great deal of the time during the first session.

(4) her problem seemed inappropriate for coding in these discussion sessions.

(5) she was already attempting to cope with her problem by a different, independent method.

Session Descriptions with All Subjects

Session 1

The first group session was fairly formal and leader dominated. Basic assumptions and certain Skinnerian principles were recapitulated for the subjects in order to lay the background for the experiment. The notions of contingencies of reinforcement, functionalism, fundamental design method, systems, dynamic movement, behaviorism, analysis and interaction were discussed. The subjects were asked to make use of these fundamental principles in developing methods appropriate to a disciplined examination of the "thought process". The immediate task was presented, namely for each subject to consider at least ten intellectual activities they commonly engaged in and then to isolate one of them as a "problem" area needing improvement. This was then to be the subject of their concentrated "thought exercises" in the immediate future. Thus, at the time of the first session individual problems had not been considered or isolated by the subjects. It therefore seems reasonable to assume that this first session could be considered as a base level of the subjects' normal behavior in a discussion situation.

The subjects were somewhat familiar with each other having been classmates (in various combinations) together over the year. They had all attended classes

and/or seminars under the direction of the group leader.

Interaction between the subjects was limited during session one. The greater part of the interaction occurred between the subjects and the leaders. For the most part it was a listening experience. Subjects were asked for their comments toward the end of the session and questions and clarifications were handled.

Individual with highest percentage of dysfunctional behavior coded:	Jennifer	18%
Individual with lowest percentage of dysfunctional behavior coded:	Orma	1%

Jennifer is the first subject to speak in this session (15 mins) responding to a direct, "any comment" question which is put out to the group as a whole. Dave made an attempt to respond to this point also but did not gain the leader's attention and waited until twenty five minutes before speaking. In the meantime, Pam asked for and received some clarification, usually from Jim. Jennifer was inattentive during these replies. Jennifer was also somewhat withdrawn during the leader's responses to her own questions. This appeared to reinforce the leader to continue speaking. Jennifer was thus rewarded by further clarification. This pattern was repeated on several other occasions when the leader addressed a question to the whole group.

Casey followed much the same pattern, losing

eye contact and fidgeting while the leader was speaking or questioning the group. He seemed reinforced when familiar task words were mentioned particularly if Jim took over the issue under discussion.

Dave in contrast to Casey lost interest during the discussion of familiar background theory particularly if other subjects were asking for clarification of points. He responded most frequently when Jim or the leader gave a short reply in answer.

Some direct references to the task ahead appeared to be discriminating stimuli for Dave. (eg. "behavior patterns", "project", "expectations"). To these he responded with increased attention.

Orma did not participate in any interaction. She sat with her arms crossed and displayed very little movement, not even reaching for her coffee cup on the table in front of her. She did not respond when the leader asked her directly, "any comments?" This negativism prompted the leader to turn to the rest of the group with his question expecting reinforcement from elsewhere. In fact he received it from Wendy who responded, "No, no questions". Casey and Jennifer both dropped their heads and avoided this situation. Perhaps Orma was attempting to redeem herself for this lack of response later when she spoke out at fifty-three minutes, even though her question was irrelevant.

Wendy was attentive but non-participating during this session. She said "um-hum" and nodded several times when the group as a whole was addressed. She answered, "No, no questions" in her single speaking incident above. She smiled and nodded to a couple of aside comments from Jennifer.

Session 2

The second session was again fairly slow-moving as basic concepts were once again reviewed. The systems approach to thought analysis was explained and handouts were given to the subjects. The participants each related their particular selected problem for the project exercises. An increased sense of group rapport appeared to develop following everyone's "confession" of a troublesome area in their intellectual activities that required some attention.

Individual with highest percentage of dysfunctional behavior coded.	Casey	23%
Individual with lowest percentage of dysfunctional behavior coded.	Jennifer	8%

Casey was the individual with the highest percentage of coded dysfunctional behavior this session, most of it relating directly to his anxiety in anticipating being required to speak to the group about his selected problem for the project.

Any questions put to the group or to another individual acted as a discriminating stimulus to Casey who responded by "ducking". He was reinforced when another individual responded.

Wendy was the first person to be called upon to relate her problem. She was initially encouraged by attention and nodding from the group. However, as the leader questioned her further and interrupted her comments. Casey, Dave, Orma and Jennifer dropped their eyes for a short period.

They all returned their attention to her fairly quickly with smiles and nods. However, Wendy did not speak again during this session although she made three unsuccessive abortive attempts to speak. On each occasion Jim interrupted. Jennifer noticed these attempts and smiled encouragement the third time. However, Wendy's attempts at speaking appeared to have been punished sufficiently to have been extinguished for this session.

Jennifer's dysfunctional behavior decreased considerably from the first session. There seemed to be some turning away when Pam was speaking or spoken to - possibly because of the sitting positions which focused the leaders' glance on Jennifer as well when addressing Pam. All other instances of Jennifer's negativism occurred during the leader's speaking times and were reinforced by the leader questioning or orienting to another

individual or the group (removal of aversive stimuli).

Dave had a number of fairly short fidgeting periods fairly evenly dispersed through the session. Several occurred when other individuals were talking but the majority were under the influence of the leader's speech. Towards the end of the session a very distinct tri-member sequence developed. When Dave dropped his head or lost eye contact with the group while the leader was speaking, he (the leader) then turned to Dave and hesitated in his delivery. This stimulated Dave to orient and return his attention thus reinforcing the leader to continue speaking.

Orma did not interact a great deal with the other group members. She had three long dysfunctional periods two of them associated with her own speaking instances where she again indulged in obsessive vocalization with rambling anecdotes. One speech was cut off by the leader and the second was disrupted by the end of the discussion period.

Session 3

The third session had an informal atmosphere. The group had collected together before the session began and had socialized. Cups of coffee were carried into the seminar room and a comfortable mood prevailed. Participants exchanged ideas and findings related to the

methods they had been using. Specific examples were cited and functional explanations were posited. Jim demonstrated the technique of charting verbally the flow of "inner processes" he had experienced following a five second "free thought" period conducted earlier in the session. The other subjects then added their own contributions to the functional analysis.

Individual with highest percentage of dysfunctional behavior coded.	Dave	9%
Individual with lowest percentage of dysfunctional behavior coded.	Jennifer	1%

These were extremely low percentages compared to the other sessions and in fact very little dysfunctional behavior was in evidence this time.

Casey operated well because he had no expected speaking requirements. He spoke spontaneously several times with no apparent build up of anxiety and his slow orientation, head-down movements were at a minimum. Toward the end of the session there was a more concentrated display of loss of eye contact and negativism following the rejection by the leader of a suggestion put to Jim by Casey.

The leader's disregard of Casey's contribution appeared punishing to Casey and he responded in his usual way.

Dave managed to receive more attention from

the leader who again was reinforced by Dave's attention if he oriented to him. Dave's intermittent fidgeting and bowed head usually occurred when other subjects were being spoken to directly.

Dave was alert and attentive during short conversations and may have suffered from stimulus deprivation when his fellow participants were speaking. However, Dave interacted to some degree with the others, addressing and reinforcing Wendy at one point and referring to some of Jennifer's comments later in the session.

Jennifer's dysfunctional behavior was very slight. She appeared attentive and interested, often making joking comments and being very supportive to Wendy.

Wendy too seemed to "bloom" in this more comfortable atmosphere. She spoke seven or eight times, often on her own initiative and increased her instances of agreeing, "um-hums". Jennifer and Dave frequently rewarded her responses. She was also reinforced on one occasion by the leader's agreement. The interruptive behavior Jim displayed toward Wendy in session two was not repeated this time. Wendy was rewarded for her comments this session and increased her speaking instances remarkably.

Orma interacted primarily with the leader, in fact interrupting his speaking on two occasions. The leader had previous aversive experiences after approaching

or attending to Orma (ie., she did not respond (session one) or spoke off the subject (session two). Thus, on this occasion he only oriented to her once and then, without awaiting much response turned to the group and joked. Orma then shortly spoke on her own accord several times, twice interrupting the leader and four times having her comments cut off by the leader's remarks. Orma may be reinforced by this method of gaining attention from the leader. She repeats the pattern three more times.

Session 4

The fourth session was again informal and consisted of a brief discussion of the project. Participants all engaged in a brief "on-the-spot" thought exercise during the session (with the exception of Jennifer who was absent when the task was proposed). Throughout the session each individual revealed the line of thought he had experienced in the immediate environment and a discussion and analysis of these thought contents were conducted involving both the participants and the instructors.

Some insights into considering prior activities to the thought exercises developed as well as an awareness of how association with objects in the immediate environment "unconsciously" infringes on the thought processes.

Individual with highest percentage of dysfunctional behavior coded	Orma	39%

Individual with lowest percentage of dysfunctional behavior coded Jennifer 0%

Orma's percentage of dysfunctional behavior was extremely high; the highest coded for anyone in any of the five sessions.

A pattern had developed during the latter part of session three when Orma was not receiving recognition from the leader and she adopted an interrupting technique leading to a thematically inconsistent anecdote which the leader in turn, interrupted. This did not appear to extinguish Orma's speaking attempts as she took two opportunities in the first eight minutes of this new session to speak. However, again, she seemed unable to make a relevant contribution and Jim, who was leading the discussion, cut her short. At fifteen minutes the leader expressed annoyance with Orma. This was followed by a five and a half minute period in which she turned away from the two instructors (removal of aversive stimuli) sitting with her head down, not orienting to various speakers and not joining in the group laughter. She returned as Jim put a question to the leader and the group laughed. This period of withdrawal followed an apparent series of punishing experiences. Orma did not venture to speak again and in fact had a further eight minutes of withdrawal and lack of orientation. At the very last moment, the leader finally asked her for her

contribution to the discussion (perhaps aware that her comments would be concluded by the ending of the seminar). This repeated pattern of punishment appeared to cause the extinction of Orma's speaking attempts. In fact, by session five, Orma excused herself from the seminar room for fifteen minutes as the end of the session approached and she had not previously been given (nor taken) an opportunity to speak.

Casey also had considerable dysfunctional behavior in session four (16%). By four minutes the in-session task had been proposed to the group and Casey was aware that he would have to take a turn at speaking. His attention from then until his turn came (24 minutes) was primarily occupied with his own task of thinking and writing. There was a half hour period in the middle of the session when Casey seemed to relax and enjoy the discussion. He was very accepting of authority statements, appearing to agree readily to any suggestions. Casey had a second concentration of head-down activity during the last ten minutes of session four. Salient stimuli preceding these latter responses appeared to be associated with Wendy and the telling of her tale which was encouraged and interrupted frequently by the leader. Perhaps this inattentive behavior by Casey when the leader was addressing Wendy was explained by Casey's sitting position -- beside Wendy he would find himself in the leader's view if he looked

up.

Wendy continued to take a more active role this session, although, interestingly enough, she did not speak at all during the first part of the period when Jennifer was absent. She initiated a couple of comments and later related her exercise when questioned but needed prodding to carry through with it. It was at this point that Casey turned away. Wendy made an unsolicited contribution as the session was drawing to a close and laughed comfortably with others in the group on several occasions.

Jennifer, the other participant present this time had no coded dysfunctional behavior. She appeared attentive and interested in all the activities and discussions.

Session 5

The wind-up session was a fairly comfortable gathering with everyone but Casey present. The main area of discussion surrounded the two hypotheses that had been posited at the beginning of the project. That is, that 1) a knowledge of behavioral principles has specific therapeutic value and 2) that thought is a form of behavior subject to behavioral laws.

Individual with highest percentage of dysfunctional behavior coded	Orma	7%
Individual with lowest percentage of dysfunctional behavior coded	Jennifer	2%

Dysfunctional behavior for everyone was at a minimum this session.

Orma was attentive, but silent until the end of the session when she excused herself from the room for a few minutes. This was perhaps the ultimate retaliation for the leader who had snubbed and interrupted her! She spoke when asked to during the fading minutes of the session just after she returned to the group.

Dave was attentive and relaxed this session, appearing particularly responsive to the abstract level of discussion being pursued. He attended and responded well to others in the group.

Wendy, while somewhat quieter this session than last, responded with a number of "um-hums" and agreeing nods but was thwarted in her speaking attempts on many occassions. Either the leader of Jim overrode her at each attempt to speak. This was a return to the pattern set in session one. However, Wendy was not so easily discouraged this time, as she tried to interject a comment on at least seven occasions.

Jennifer exhibited very little disfunctional behavior during this final session and no particular sequence of events developed into a pattern.

CHAPTER IV

CONCLUSIONS

The many variables that must be considered in any study of human behavior make it a very complex situation indeed. To cloud the issue further by attempting to look at covert behavior in a naturalistic setting compounds the question even further. Nevertheless, this thesis has proposed a method of approach to the analysis of this complex situation. We have attempted to identify objectively patterns of relationships between covert responses (thought content) and the environment.

This study represents only a beginning, a stepping stone towards a more definitive methodology. The formulation that thought is behavior has powerful face validity, that thought is under the control of the environment is a more debatable proposition. What we are asserting is that thought, as behavior, must be under the jurisdiction of the same fundamental laws of behavior which govern all operant responses. Whether these operants be public or private seems to be beside the point.

What has been established in this experiment is that when thought is analysed with reference to the total environment in which it occurs, functional relationships between thoughts and external stimuli of an unexpected

character are readily discerned. Introspective approaches to the study of internal, covert activities have in the past willfully ignored the external environment as a source of thought content on the grounds that the thinking process was relatively autonomous and creative.

Nevertheless, while this study reflects a certain improvement in methodology for dealing with covert behavior the study cannot be taken as definitive. In the analysis of our data there remained a number of operants where 'internal' thematic links were still the only explanation available to us. This discrepancy with hypothesis may be due to a number of possibilities:

(1) The analyses relied heavily on the validity of the subjects' "translations" of their internal activities. It is doubtful whether the overt verbalizations perfectly reflect in sequence and complexity the subjects' covert thought processes.

(2) It will be noted that almost all the external stimuli identified through the "time lag" method referred to physical objects in the room or verbal behavior of the other subjects.

Thus possibilities such as temperature changes, vibrations, noises from outside the room, odors (perfume, coffee, cigarette smoke) were not captured for later analysis and association. Internal stimuli, for example, toothache, a bruised ankle, or an intestinal cramp were

not recorded. Much of the inner bodily metabolism was unavailable for analysis. Nor were the possibilities of kinesthetic associations explored, for example, from a handkerchief to the nose, an uncomfortable chair or knees touching under the table.

These considerations raise the possibility of repeating the study with a number of more stringent controls. We are thinking of such possibilities as the 'thinkers' using ear plugs or blind folds, or in some other way, working within a restricted environment. Subjects trained in "introspection" should also be used.

In repeating the experiment, consideration should also be given to a more exact method of identifying exactly when the thought to be analysed is taking place. This might be done by a signal being given at the beginning and end of the sequence - eg. a light being pressed on and off. More sessions and a tough training period for the subjectsmight also facilitate more exact translations of thought into verbal reports of thought.

Nevertheless, a considerable advance has been made in a method for studying reported thought sequences and understanding them more fully in light of the total environment in which the thinking occurred.

Our second hypothesis, that an understanding of behavioral laws might have a therapeutic effect for the individual in the light of some (mild) dysfunctional

activity was not well substantiated.

Two subjects, Jennifer and Dave, did, according to our definition show a therapeutic change over the experimental period. Whether these changes were causally related to their increased knowledge of specific patterns of reinforcements operating in their own system, or not, is a matter for conjecture. The "improvement" could be due to greater familiarity with the persons involved. Casey, Wendy and Orma did not appear to have a systematic decrease in dysfunctional behavior. However, Wendy was able to increase in the percent of speaking out instances and thus indicate progress. Whether there was a transfer of therapeutic effect to other similar situations for any of these subjects,while not part of our concern in this study, is nevertheless an interesting possibility.

Certainly our detailed analysis of the taped sessions allowed us to identify many recurring tri-member sequences for each individual - provided we identified the overt manifestations of their academic 'problem' in a sufficiently definitive and objective way.

These patterns were not thoroughly discussed with them in the group sessions. Although in the individual interviews, somewhat more attention was directed to the 'problem' behaviors, in fact, no attempt was made to apply "treatment" during the experiment. That is, while the subjects' overall knowledge of behavioral principles

was expanded during the sessions, specific knowledge of their own behavior and of particular positive and negative reinforcers operating for them were not developed.

In all, this was a pilot study in a methodology to record and analyse thought content from verbal report. As such it proved worthy of being tested. And certainly it offers a more empirically supported approach to the laws affecting covert activity than do the mentalistic theories of the majority of our predecessors and contemporaries.

The implications for educators are not profound, at least at this point in time. The physical and social environment of the classroom seems to have a controlling influence on students and their "higher mental processes" in ways in which teachers are entirely unaware. The fact that individuals operate in a dynamic situation where salient stimuli and reinforcers change from movement to movement must become part of what a teacher is aware of in his/her effort to 'control' the students' thinking and learning.

Objectively identifying stimuli, responses and reinforcements is a complex problem in a dynamic situation. Nevertheless, this study has contributed to our understanding of thought and to its place in the behavioral model.

BIBLIOGRAPHY

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Bales, R.F., Personality and Interpersonal Behavior, New York: Holt, Rinehart and Winston, 1970.

Boring, E.G., A History of Experimental Psychology, New York: Appleton-Century-Crofts, 1957.

Esper, E.A., A History of Psychology, Philadelphia: W.B. Saunders Company, 1964.

Garrett, H.E., Great Experiments in Psychology, New York: D. Appleton-Century Co., 1932.

Helmholtz, H., Popular Scientific Lectures, New York: Dover Publications, Inc., 1962.

Homme, L.E. Perspectives in Psychology, XXIV. Control of Coverants, the operants of the mind. Psychological Record, 1965, 15, 501-511.

Humphrey, G., Thinking, London: Methuen & Co. Ltd., 1951.

Johnson, D.M., Systematic Introduction to the Psychology of Thinking, New York: Harper and Row, 1972.

Mandler, J.M., and Mandler, G., Thinking: From Association to Gestalt, New York: John Wiley & Sons, Inc., 1964.

McKellar, P., Imagination and Thinking, London: Cohen and West, 1957.

McLeish, J., The Science of Behavior, London: Barrie and Rochliff, 1963.

McLeish, J., Matheson W. and Park. J., The Psychology of the Learning Group, London: Hutchinson University Library, 1973.

McLeish, J., No Black Scorpion, unpublished manuscript.

McLeish, J. and Martin, J.F., Verbal Behavior: An experimental analysis. Journal of General Psychology, 1975, in press.

Pavlov, I.P., Experimental Psychology and Other Essays, New York: Philosophical Library, 1957.

Salzinger, K. and Salzinger, S., (Eds) Research in Verbal Behavior, New York: Academic Press, 1967.

Sechenov, I.M., Reflexes of the Brain, Cambridge: The M.I.T. Press, 1965.

Skinner, B.F., Science and Human Behavior, New York: MacMillan, 1953.

Skinner, B.F., Verbal Behavior, New York: Appelton-Century-Crofts, 1957.

Skinner, B.F., About Behaviorism, New York: Alfred Knopf, 1974.

Vygotsky, L.S., Thought and Language, Cambridge: The M.I.T. Press, 1962.

REFERENCES

Bales, R.F., Interaction Process Analysis, A Method for the Study of Small Groups,Reading,Mass: Addison-Wesley Pub. Co., 1950.

Flanders, N., Analyzing Teaching Behavior, Reading, Mass., Addison-Wesley Pub. Co., 1971.

Matchett, E., Fundamental Design Method, from The Accelerated Development of Creative Mental Skills, private communication, 1968.

Mc Corquadale,K., and Meehl, P., On a distinction between hypothetical constructs and intervening variables,Psychological Reveiw, 1948,55, 95-107.

McLeish, J., Simulations in Higher Education,Cambridge: Cambridge Institute of Education, Monograph Series, No. 2, 1970. pp.9-16

McLeish, J., The Origin of Psychology as a Science, The Alberta Journal of Educational Reseach,Vol. XVIII, No. 3, Sept. 1972.

APPENDIX A

SYMBOLS FOR CODED BEHAVIOR ON TIME CHARTS

Table 1

	Symbol	Meaning	Symbol	Meaning
Persons:	C	Casey	J	Jim
	D	Dave	L	Leader
	G	Group	Or	Orma
	Id	Individual	P	Pam
	Je	Jennifer	We	Wendy

Behaviors:	Symbol	Meaning
	Asp	Attempts to speak
	EC	Eye contact
	F	Fidgeting (rubbing, shifting in seat)
	H	Head in hands
	Hd	Head down
	I	Interrupts
	Jo	Jokes
	LA	Leans away
	Lf	Laughs
	N	Nods, smiles, agrees
	O	Orients
	Q	Questions
	R	Replies, responds
	Sp	Speaks (speaking)
	Sp^{+}	finishes speaking

Table continued

Table 1 continued

Behaviors:	Symbol	Meaning
	Tp	Tapping, smoking ritual
	TH	Thematically consistent
	W	Writes
	Ob	Obsessive Vocalization

/ negative; eg. E/C, lack of eye contact
Ø, doesn't orient

* continues; eq. Sp^*, continues speaking
repeats; Q^*, repeats question

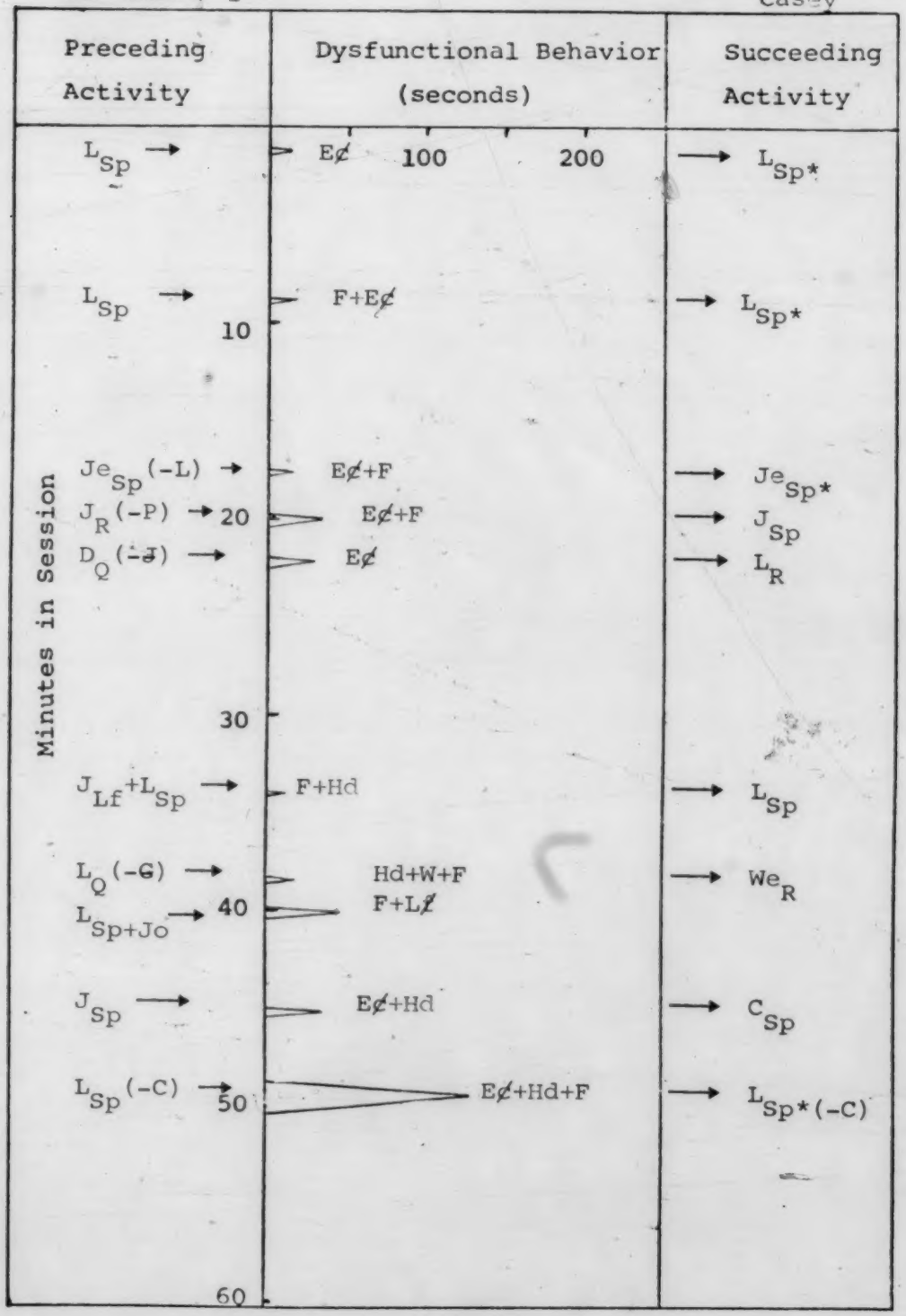
→ leads to; eq. $J_{sp} \rightarrow We_{Asp}$, Jim speaking leads to Wendy attempting to speak

- to, address; eq L_Q (-G), Leader addresses a question to the group.
J_R (-P), Jim responds to Pam

TIME CHARTS

Coded Dysfunctional Behavior

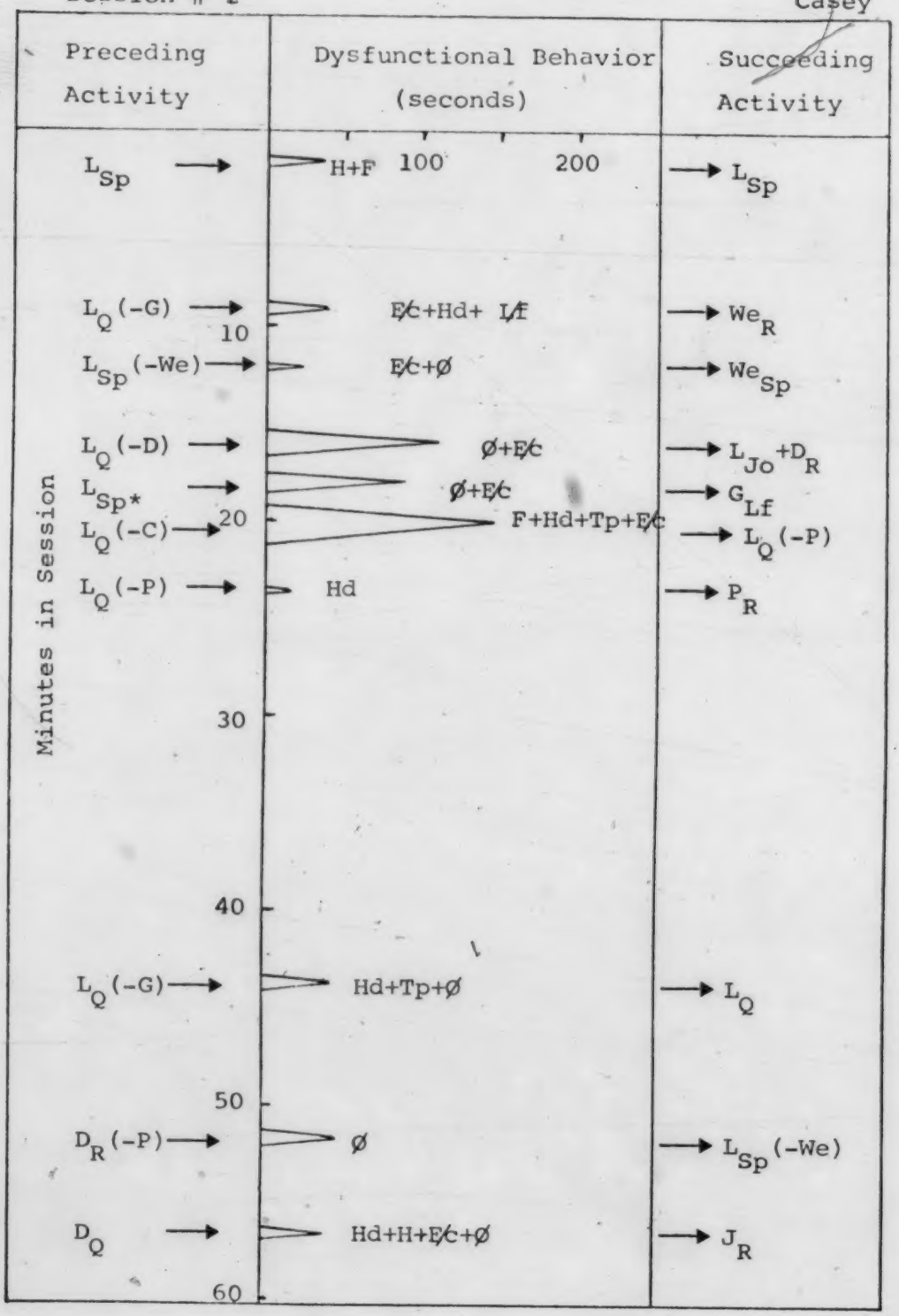
Session # 1 Casey



Coded Dysfunctional Behavior

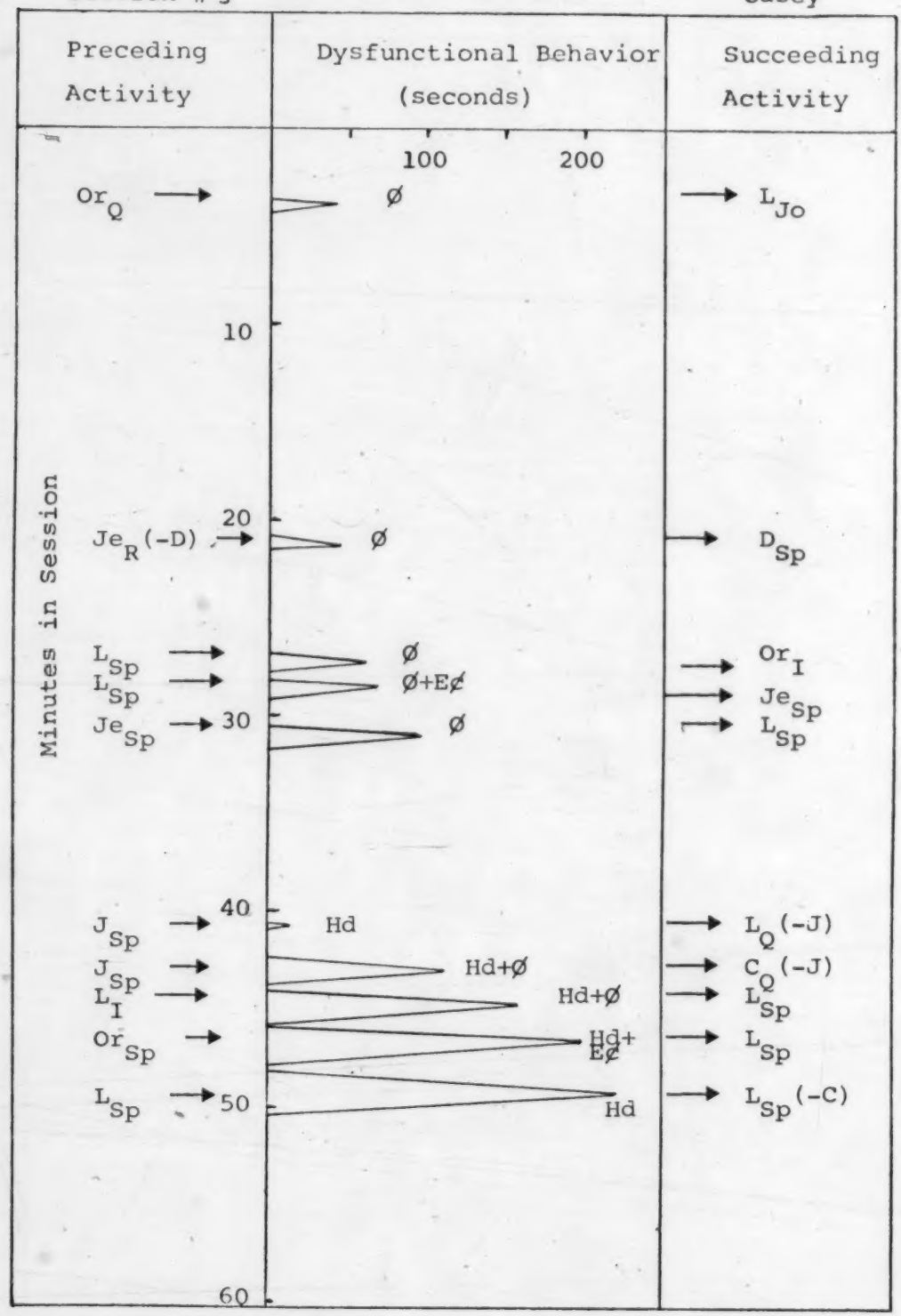
Session # 2

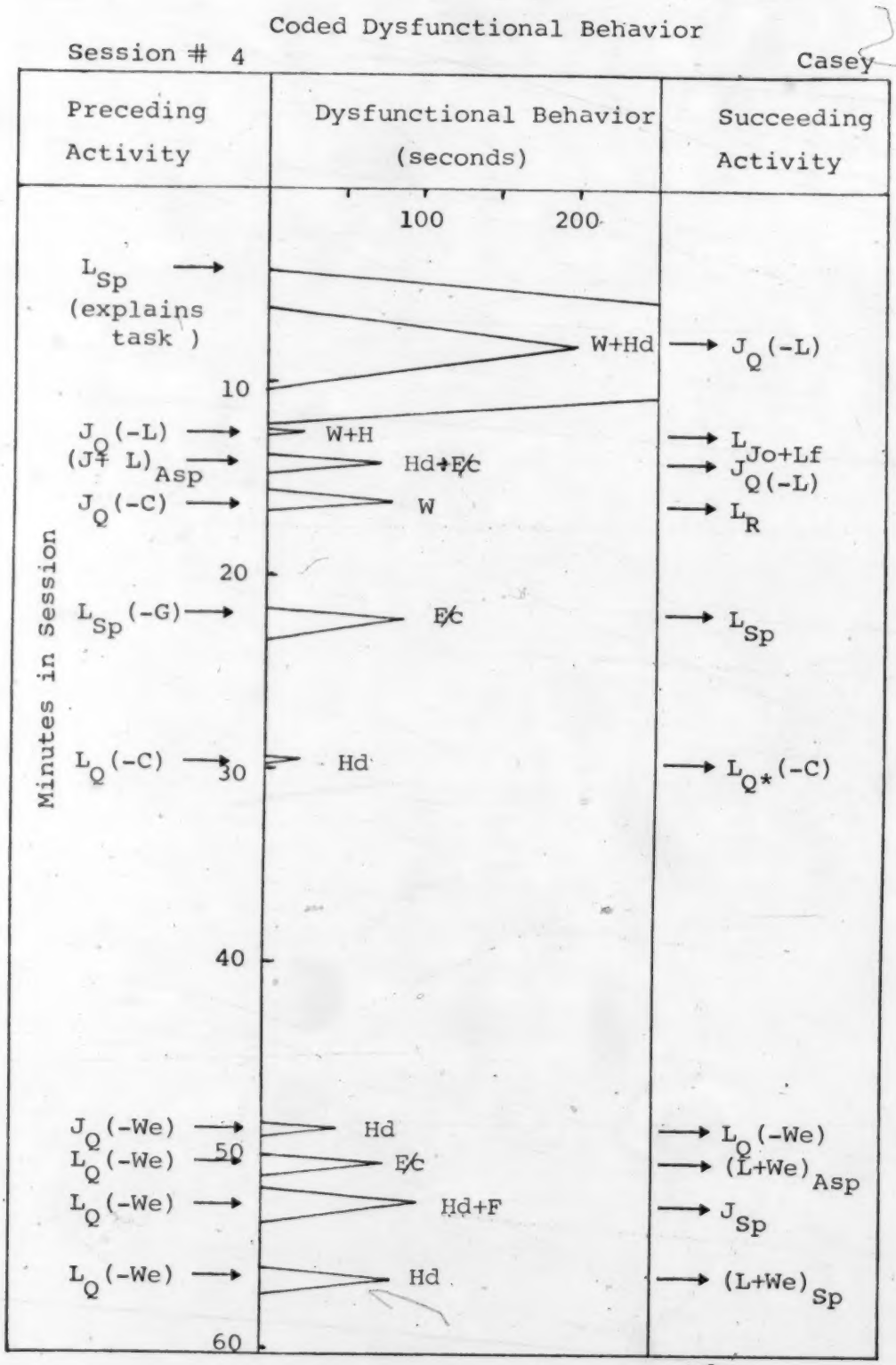
Casey



Coded Dysfunctional Behavior

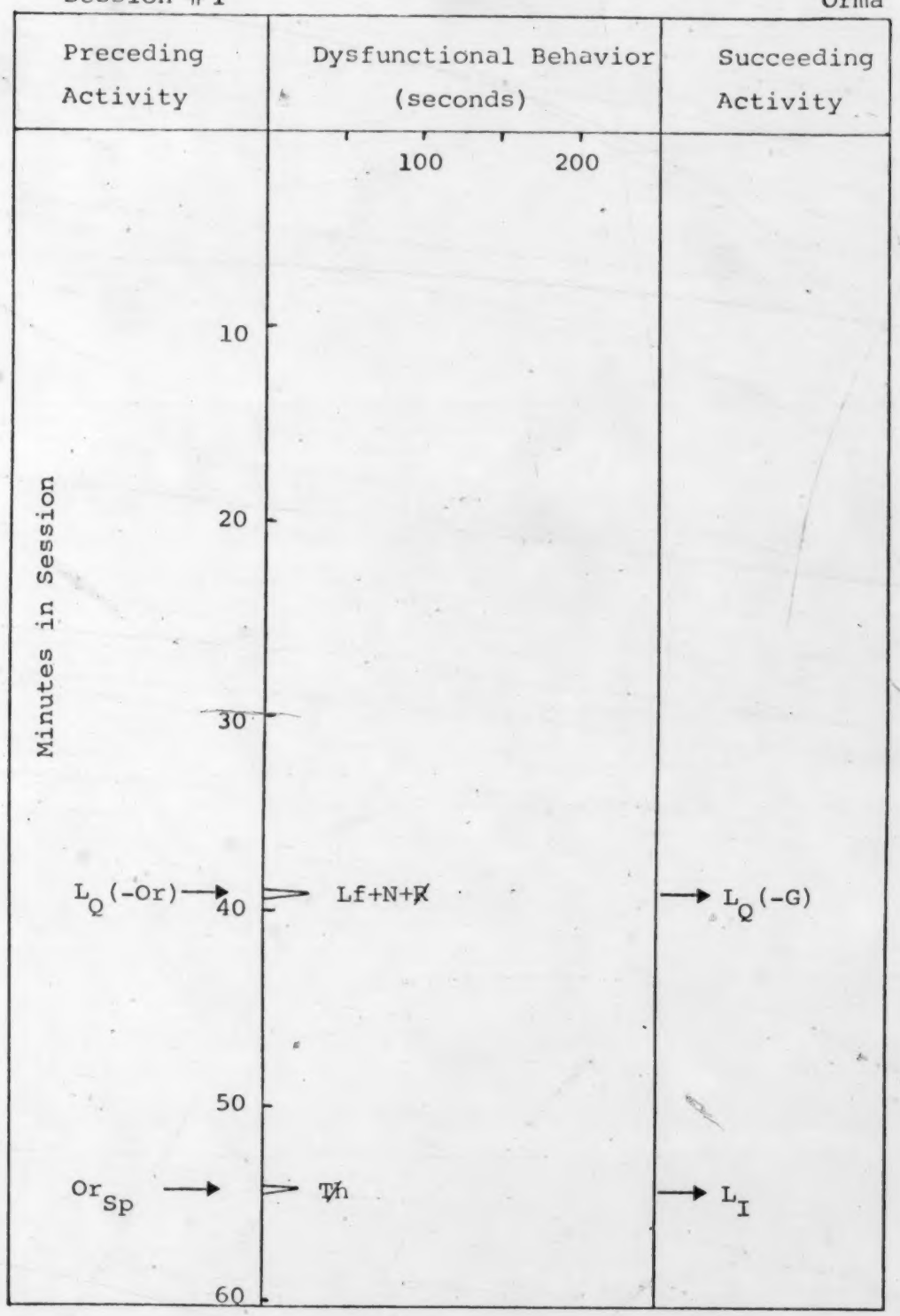
Session # 3 Casey




Coded Dysfunctional Behavior
Session # 4
Casey
Preceding Activity
Dysfunctional Behavior (seconds)
Succeeding Activity
100
200
Minutes in Session
10
20
30
40
50
60
L_{Sp} (explains task)
W+Hd
J_Q(-L)
J_Q(-L)
W+H
L_{Jo+Lf}
$(J \mp L)_{Asp}$
Hd+E/c
J_Q(-L)
J_Q(-C)
W
L_R
L_{Sp}(-G)
E/c
L_{Sp}
L_Q(-C)
Hd
L_{Q*}(-C)
J_Q(-We)
Hd
L_Q(-We)
L_Q(-We)
E/c
$(L+We)_{Asp}$
L_Q(-We)
Hd+F
J_{Sp}
L_Q(-We)
Hd
$(L+We)_{Sp}$

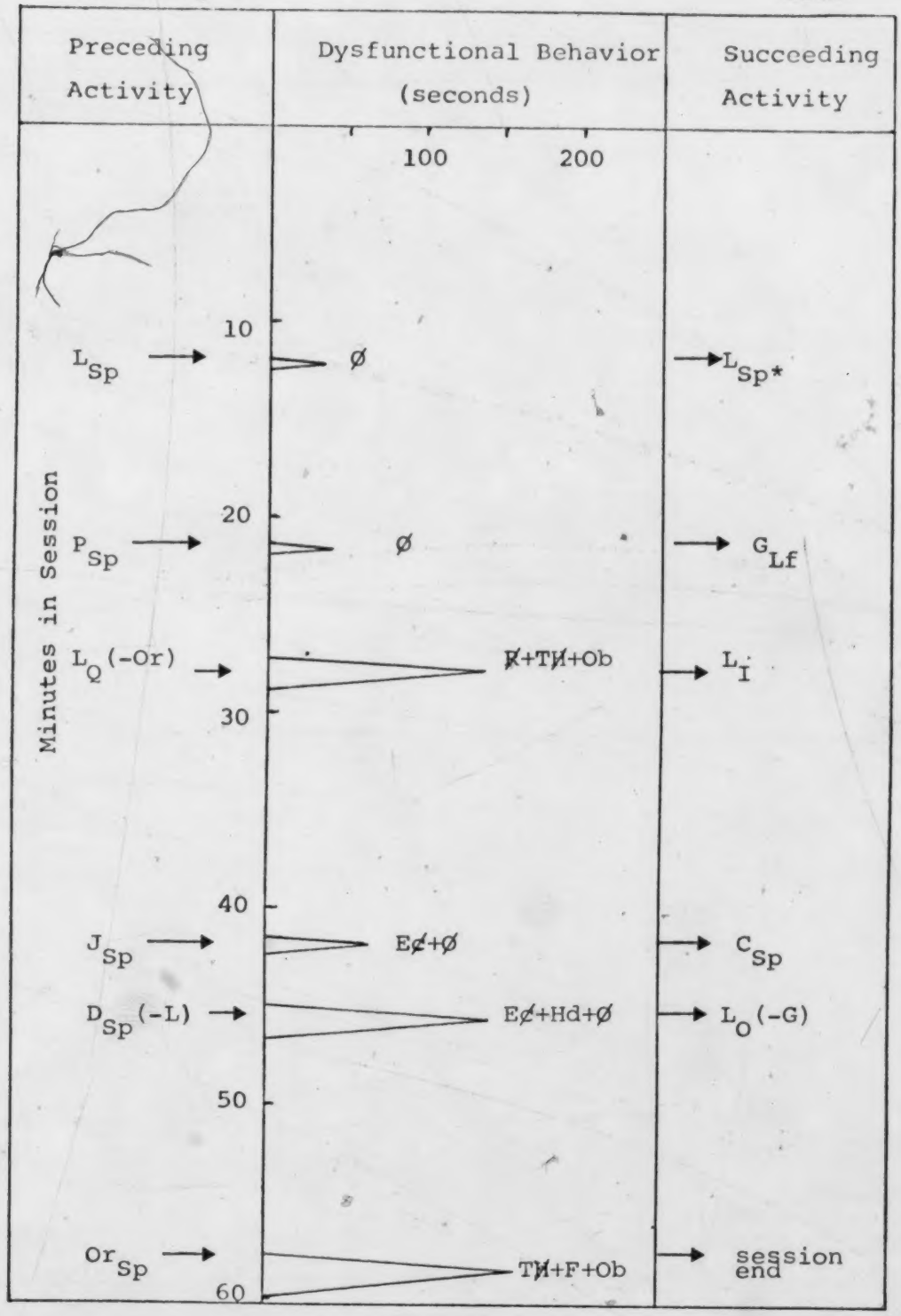
Coded Dysfunctional Behavior

Session # 1 Orma



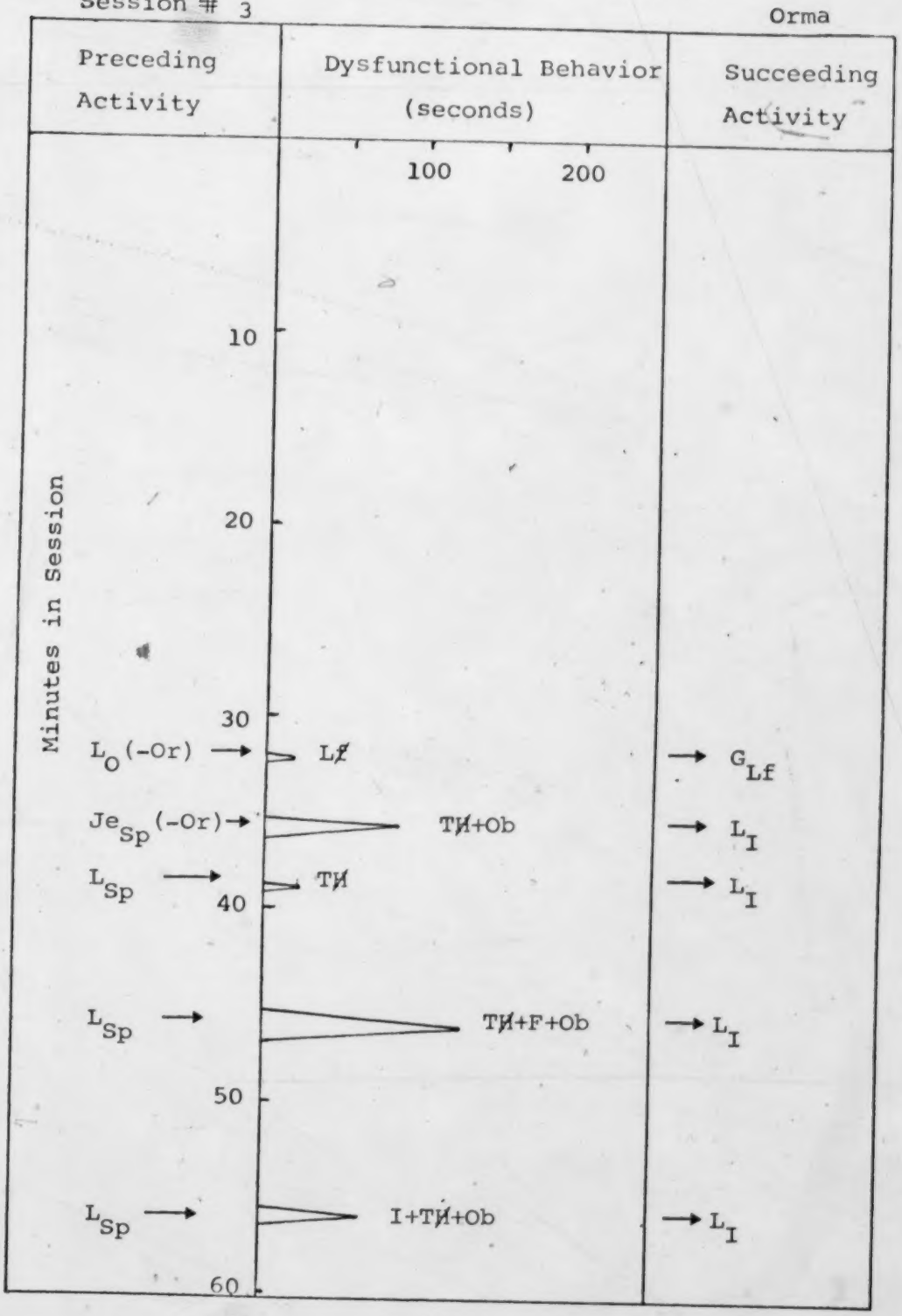
Coded Dysfunctional Behavior

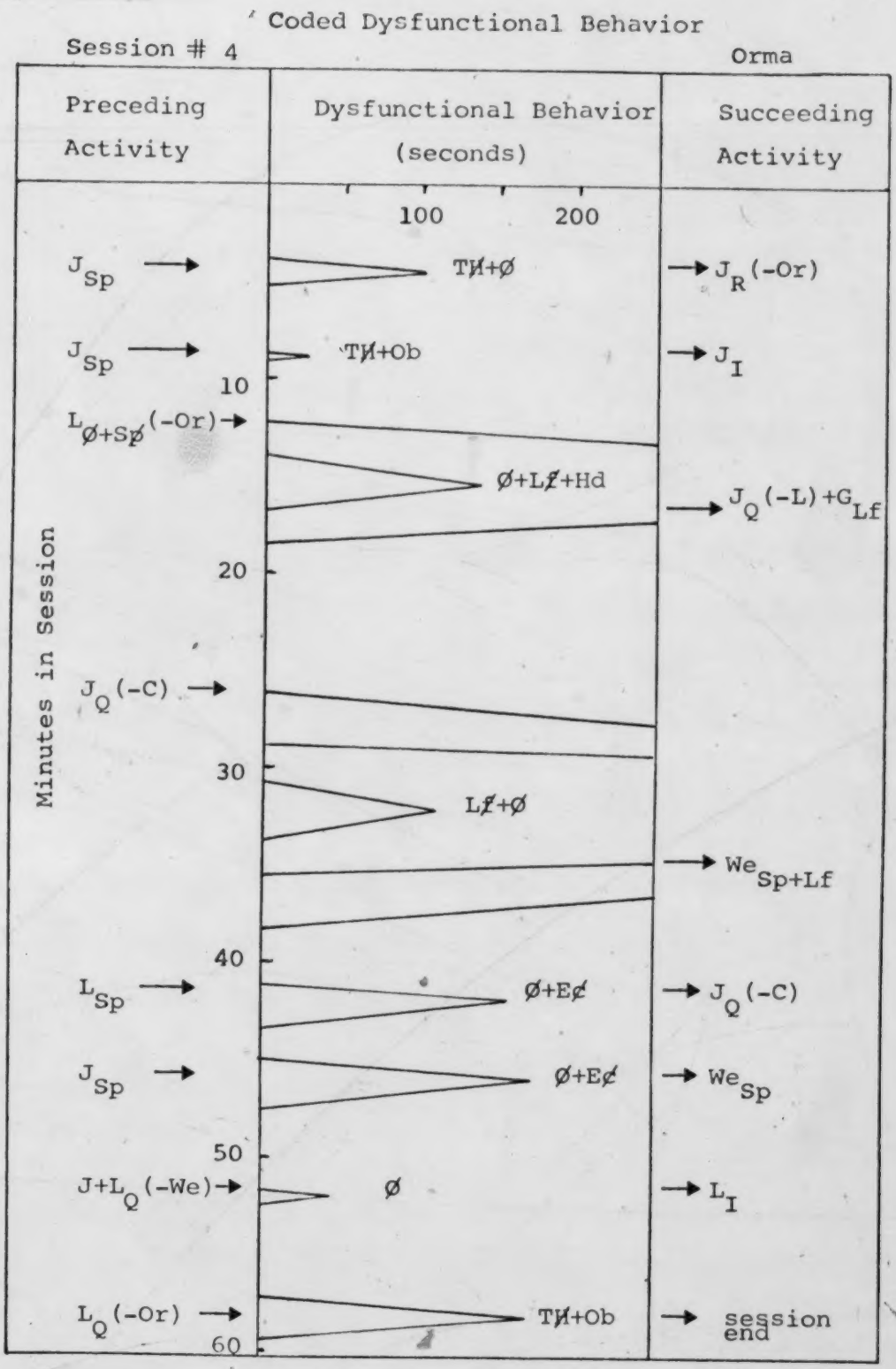
Session # 2 Orma



Coded Dysfunctional Behavior

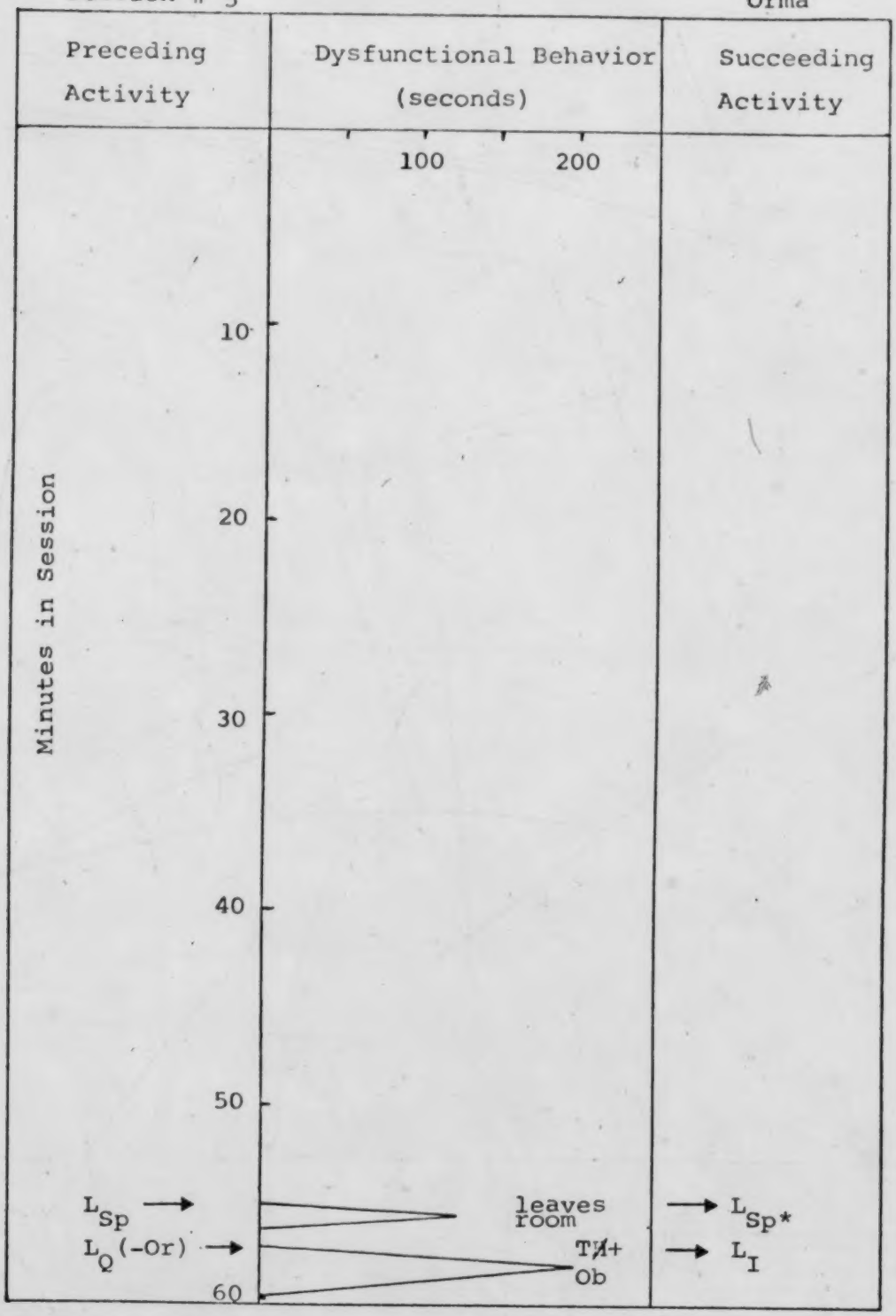
Session # 3 Orma

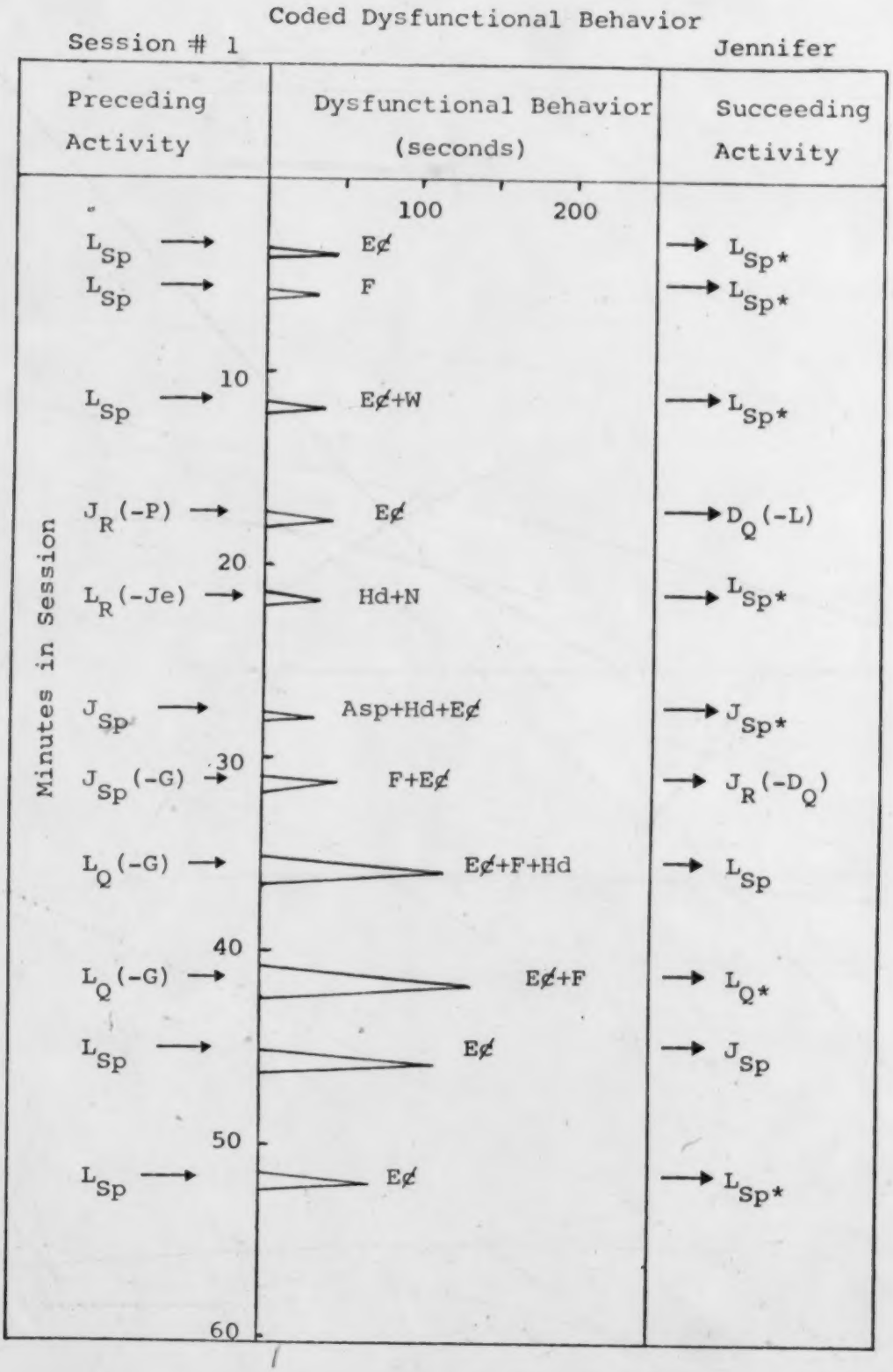



Coded Dysfunctional Behavior
Session # 4
Orma
Preceding Activity
Dysfunctional Behavior (seconds)
Succeeding Activity
100
200
Minutes in Session
10
20
30
40
50
60
J_{Sp} →
J_{Sp} →
$L_{\emptyset+S\not\emptyset}$(-Or)→
J_Q(-C) →
L_{Sp} →
J_{Sp} →
$J+L_Q$(-We)→
L_Q(-Or) →
T#+Ø
T#+Ob
Ø+L/+Hd
L/+Ø
Ø+E/
Ø+E/
Ø
T#+Ob
→ J_R(-Or)
→ J_I
→ J_Q(-L)+G_{Lf}
→ We_{Sp+Lf}
→ J_Q(-C)
→ We_{Sp}
→ L_I
→ session end

Coded Dysfunctional Behavior

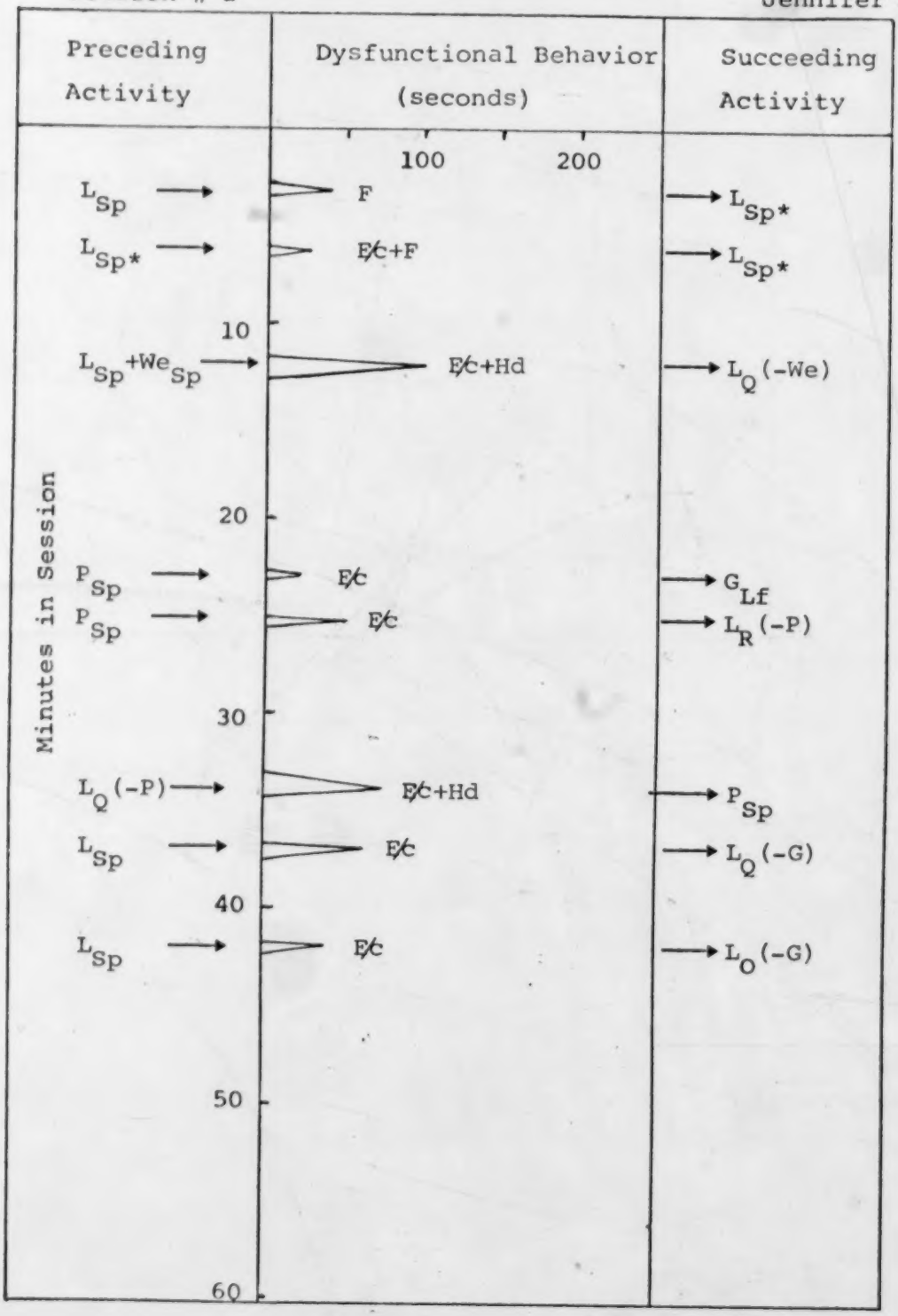
Session # 5 Orma




Coded Dysfunctional Behavior
Session # 1
Jennifer
Preceding Activity
Dysfunctional Behavior (seconds)
Succeeding Activity
100
200
Minutes in Session
10
20
30
40
50
60
L_{Sp} → E∅ → L_{Sp}*
L_{Sp} → F → L_{Sp}*
L_{Sp} → E∅+W → L_{Sp}*
J_R(-P) → E∅ → D_Q(-L)
L_R(-Je) → Hd+N → L_{Sp}*
J_{Sp} → Asp+Hd+E∅ → J_{Sp}*
J_{Sp}(-G) → F+E∅ → J_R(-D_Q)
L_Q(-G) → E∅+F+Hd → L_{Sp}
L_Q(-G) → E∅+F → L_Q*
L_{Sp} → E∅ → J_{Sp}
L_{Sp} → E∅ → L_{Sp}*

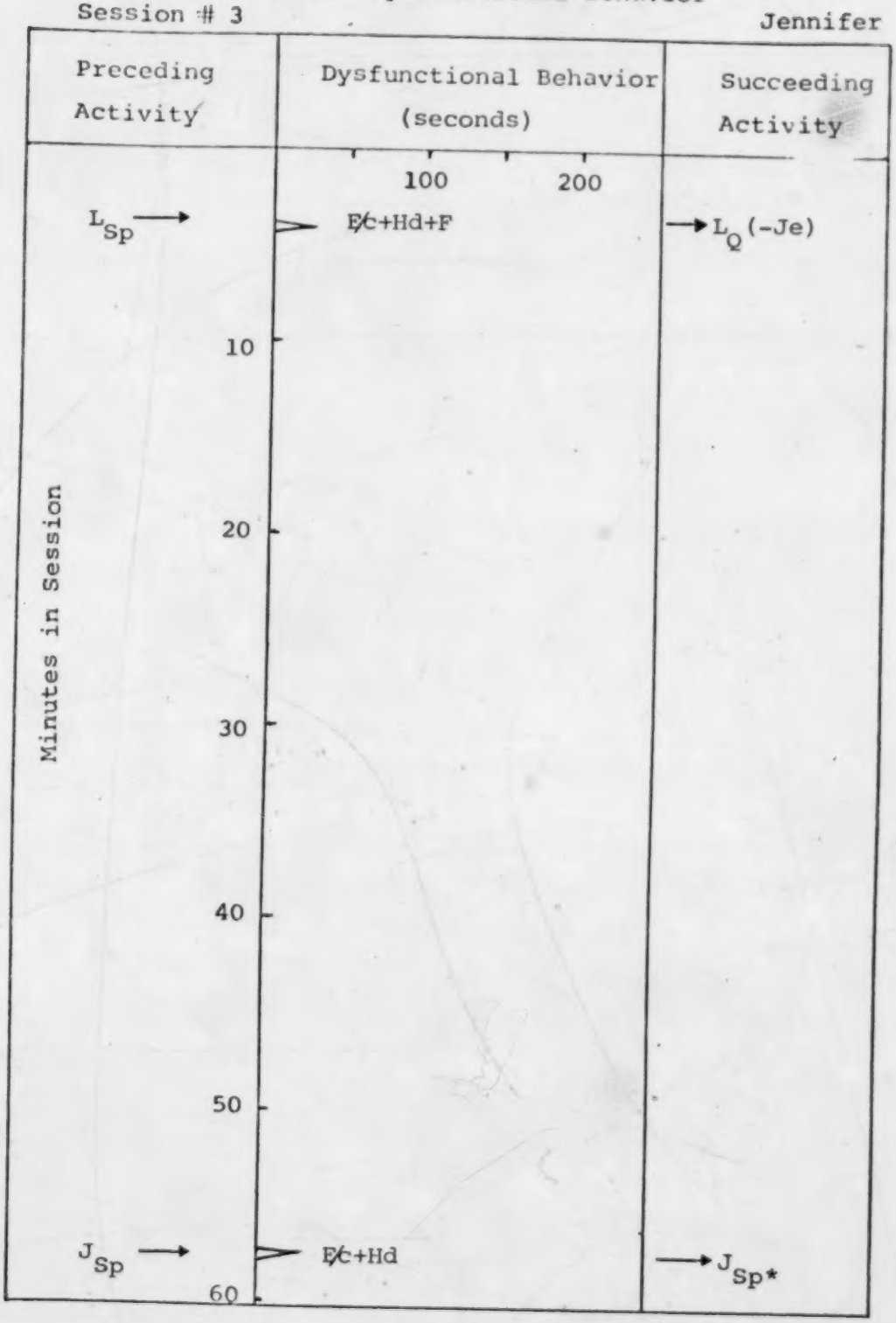
Coded Dysfunctional Behavior

Session # 2 Jennifer



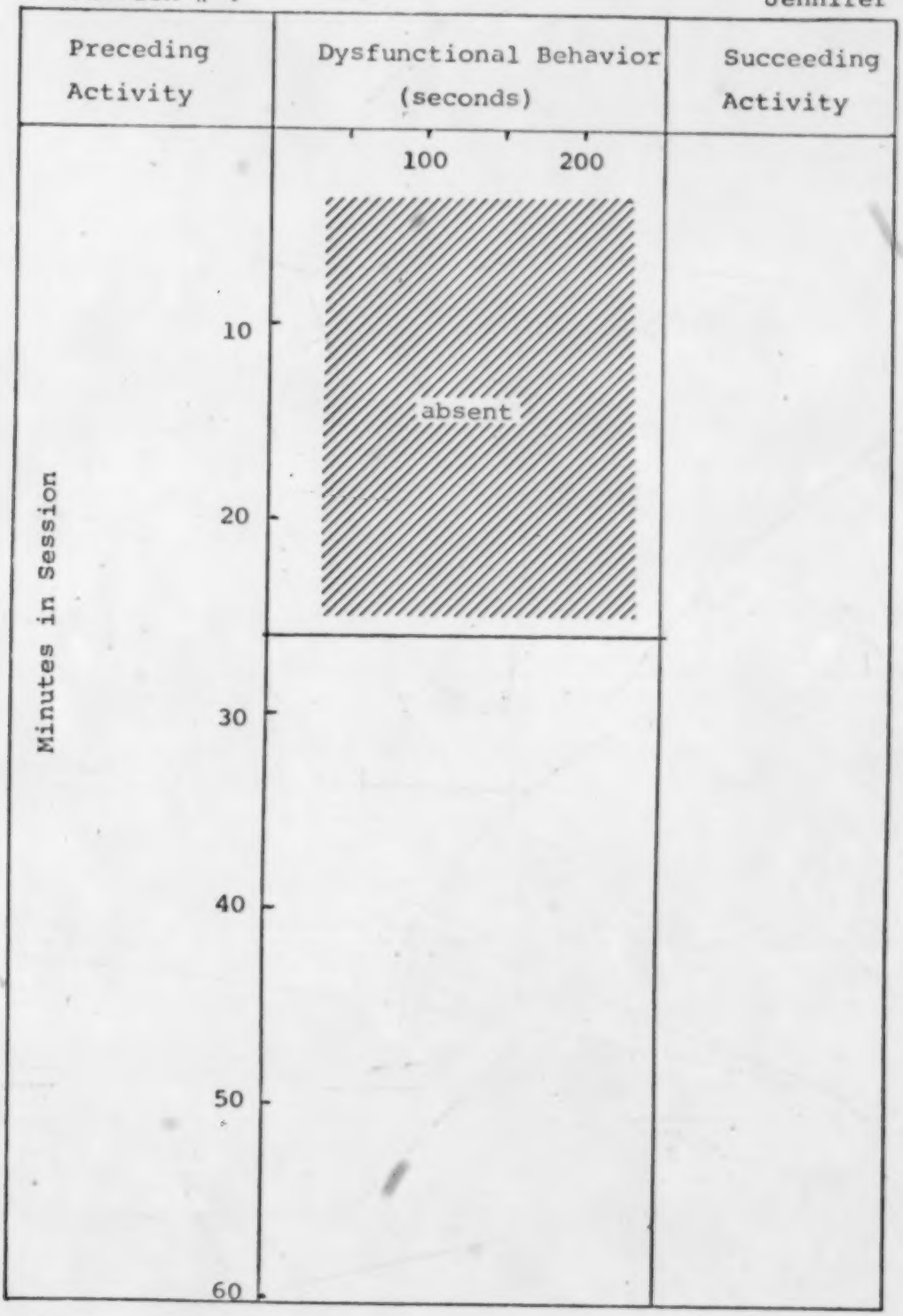
Coded Dysfunctional Behavior

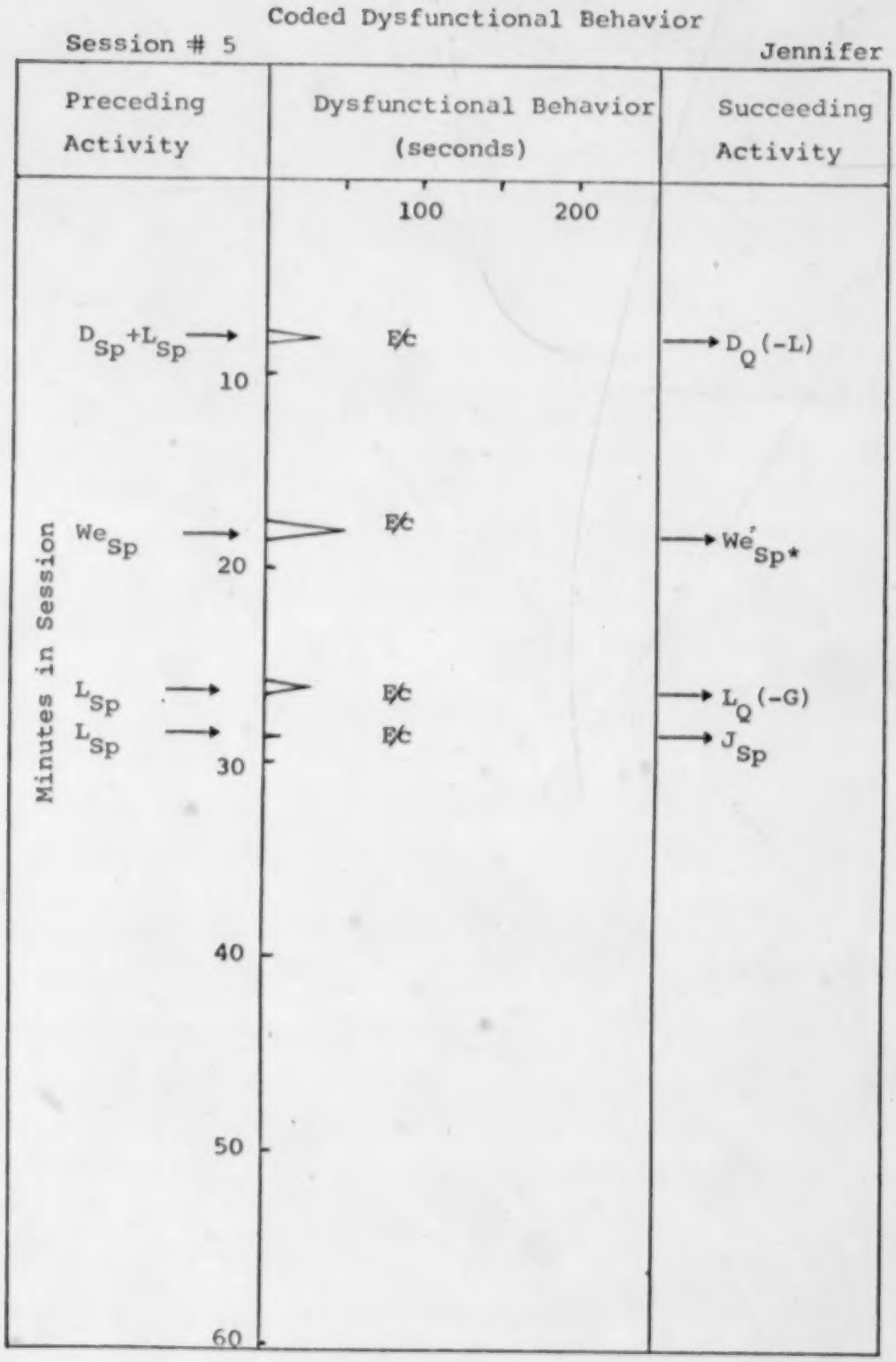
Session # 3 Jennifer



Coded Dysfunctional Behavior

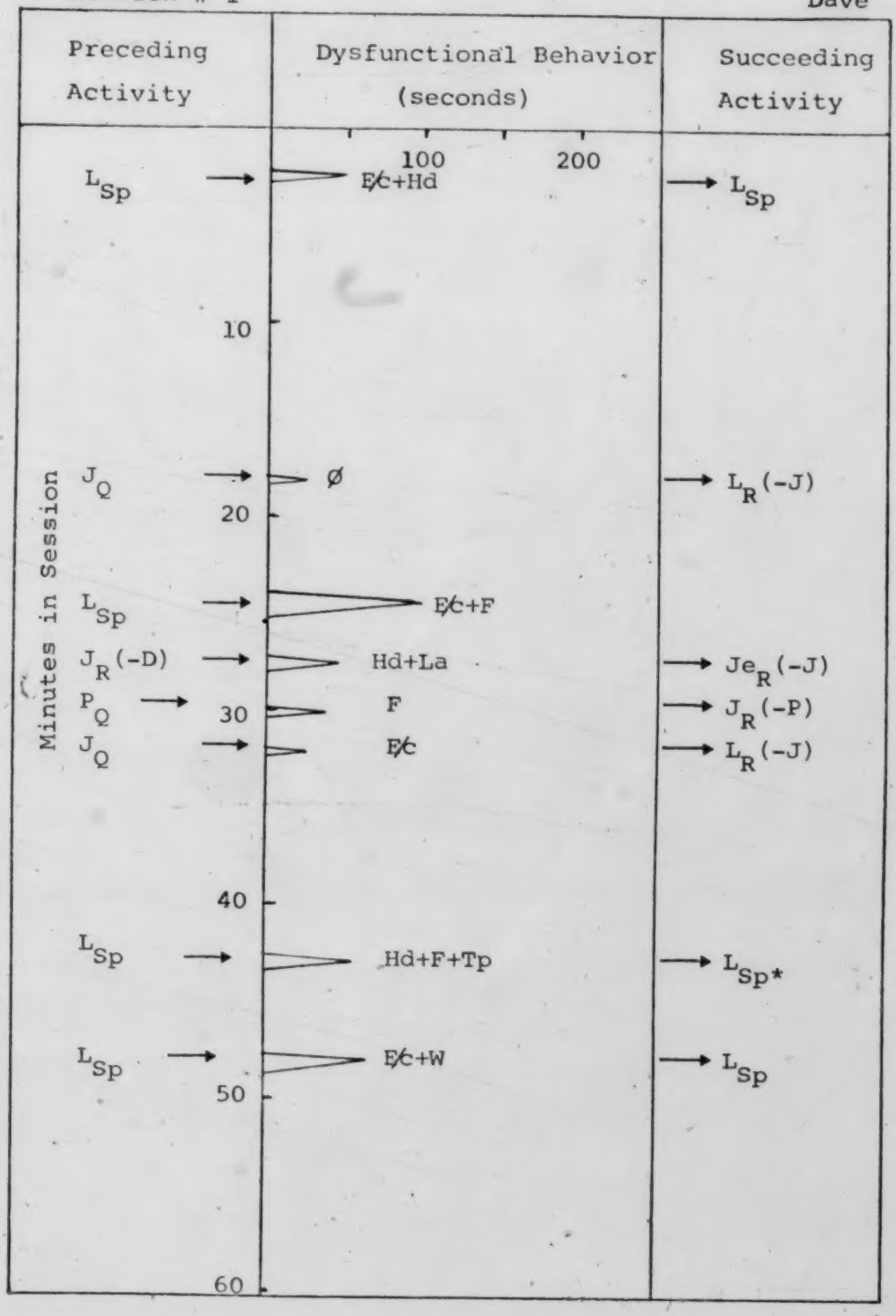
Session # 4 Jennifer



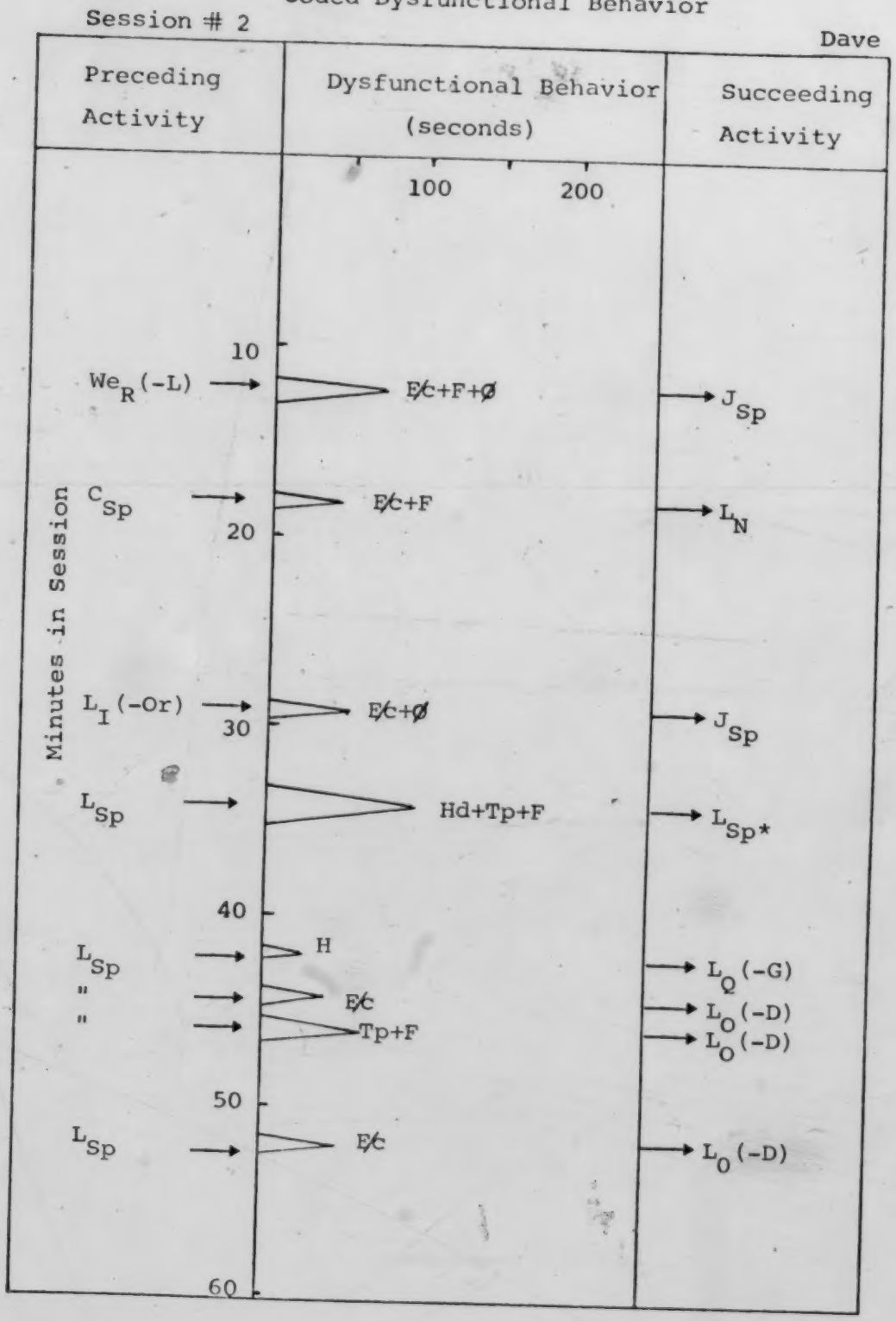

Coded Dysfunctional Behavior
Session # 5
Jennifer
Preceding Activity
Dysfunctional Behavior (seconds)
Succeeding Activity
100
200
Minutes in Session
10
20
30
40
50
60
$D_{Sp}+L_{Sp}$
E/c
D_Q (-L)
We_{Sp}
E/c
We'_{Sp}*
L_{Sp}
E/c
L_Q (-G)
L_{Sp}
E/c
J_{Sp}

Coded Dysfunctional Behavior

Session # 1 Dave

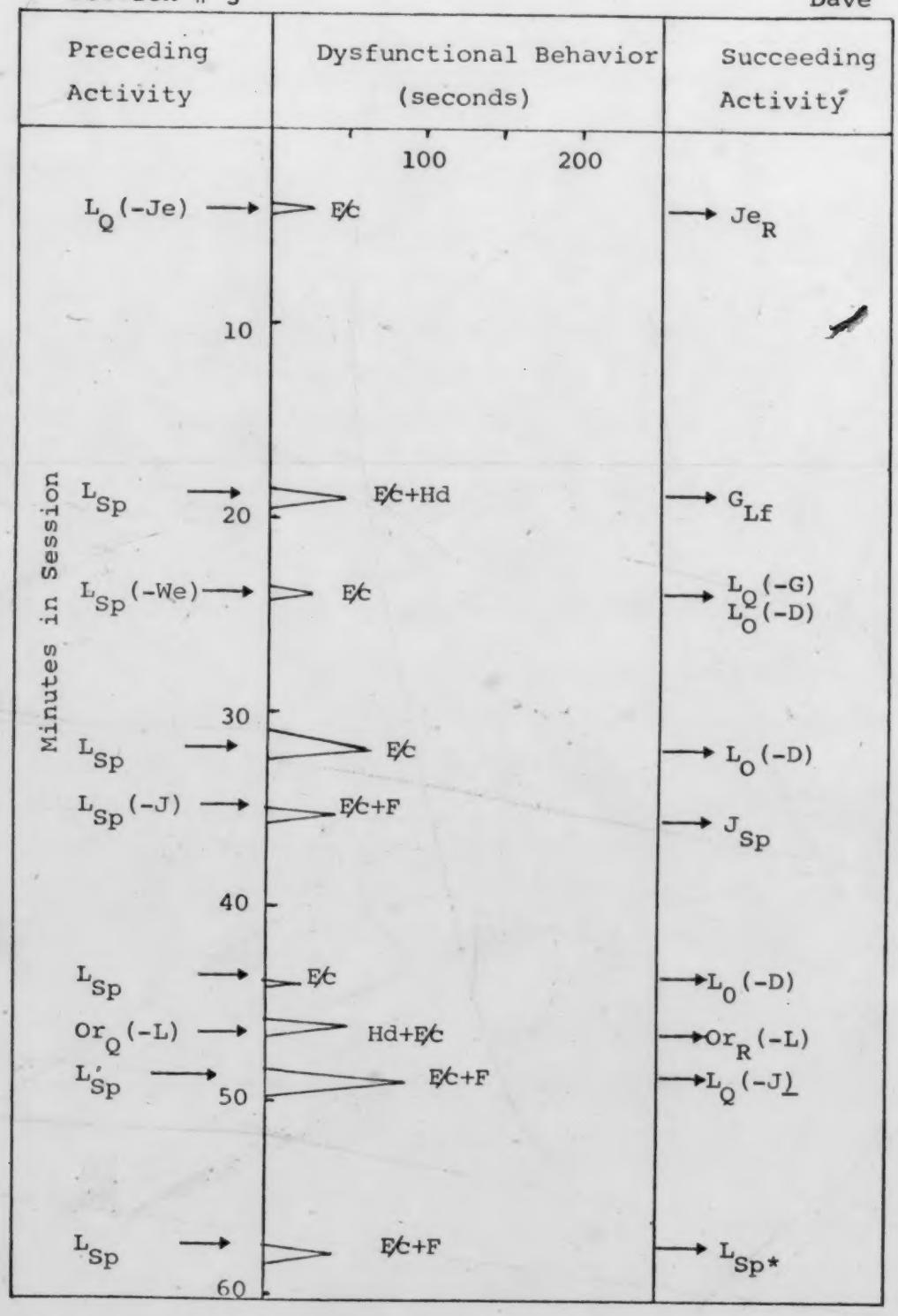


Coded Dysfunctional Behavior



Coded Dysfunctional Behavior

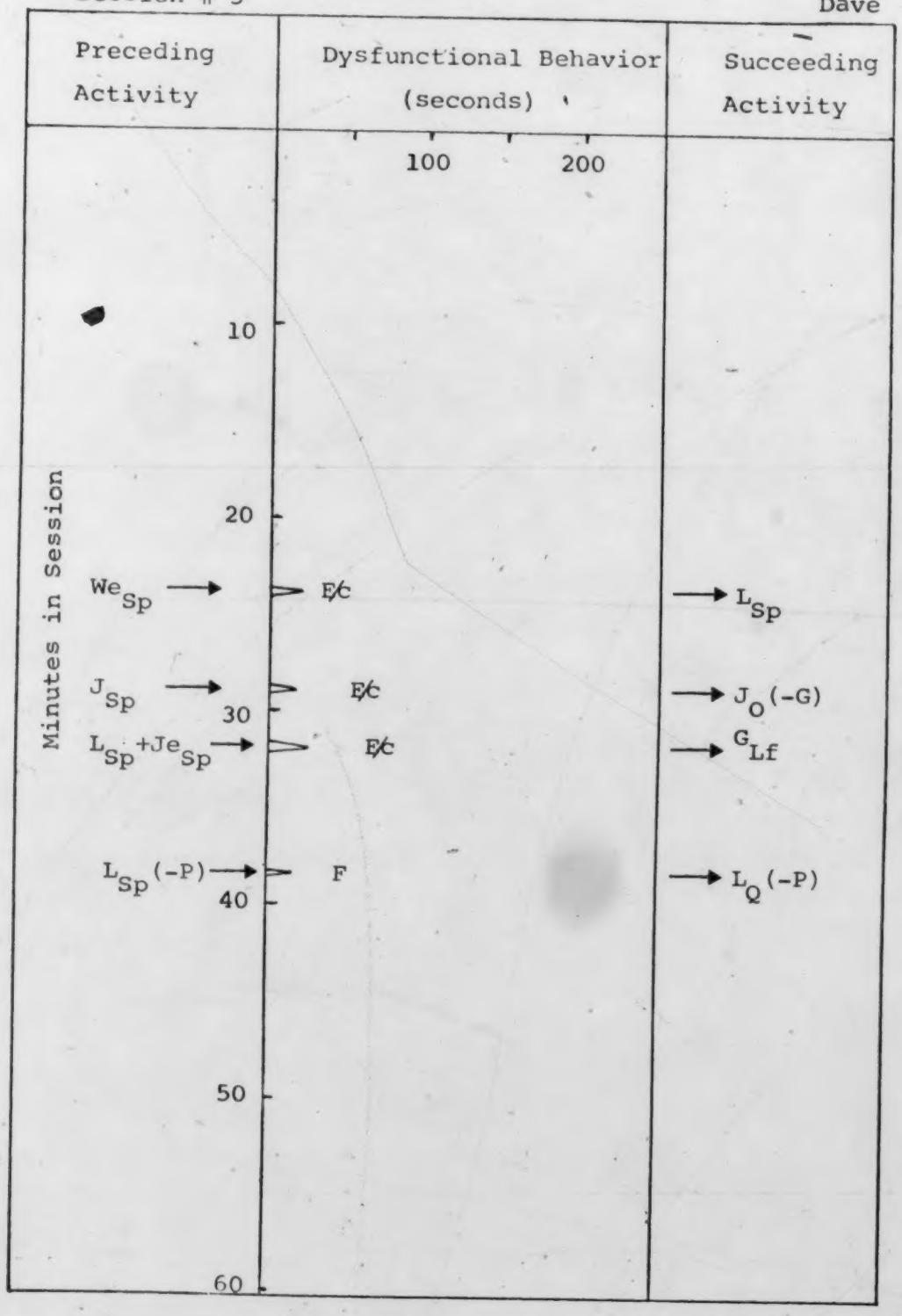
Session # 3 Dave

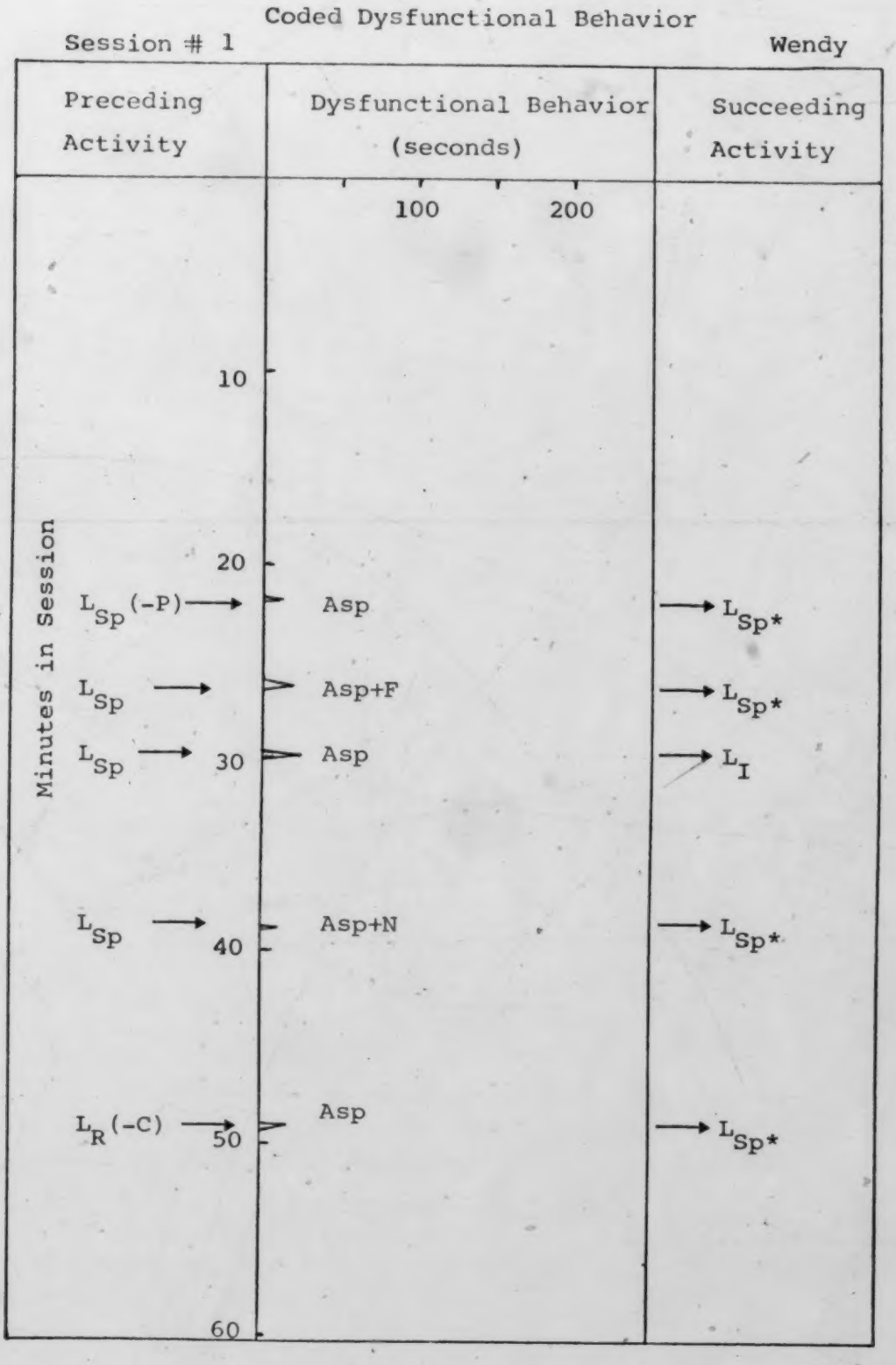


Coded Dysfunctional Behavior

Session # 5

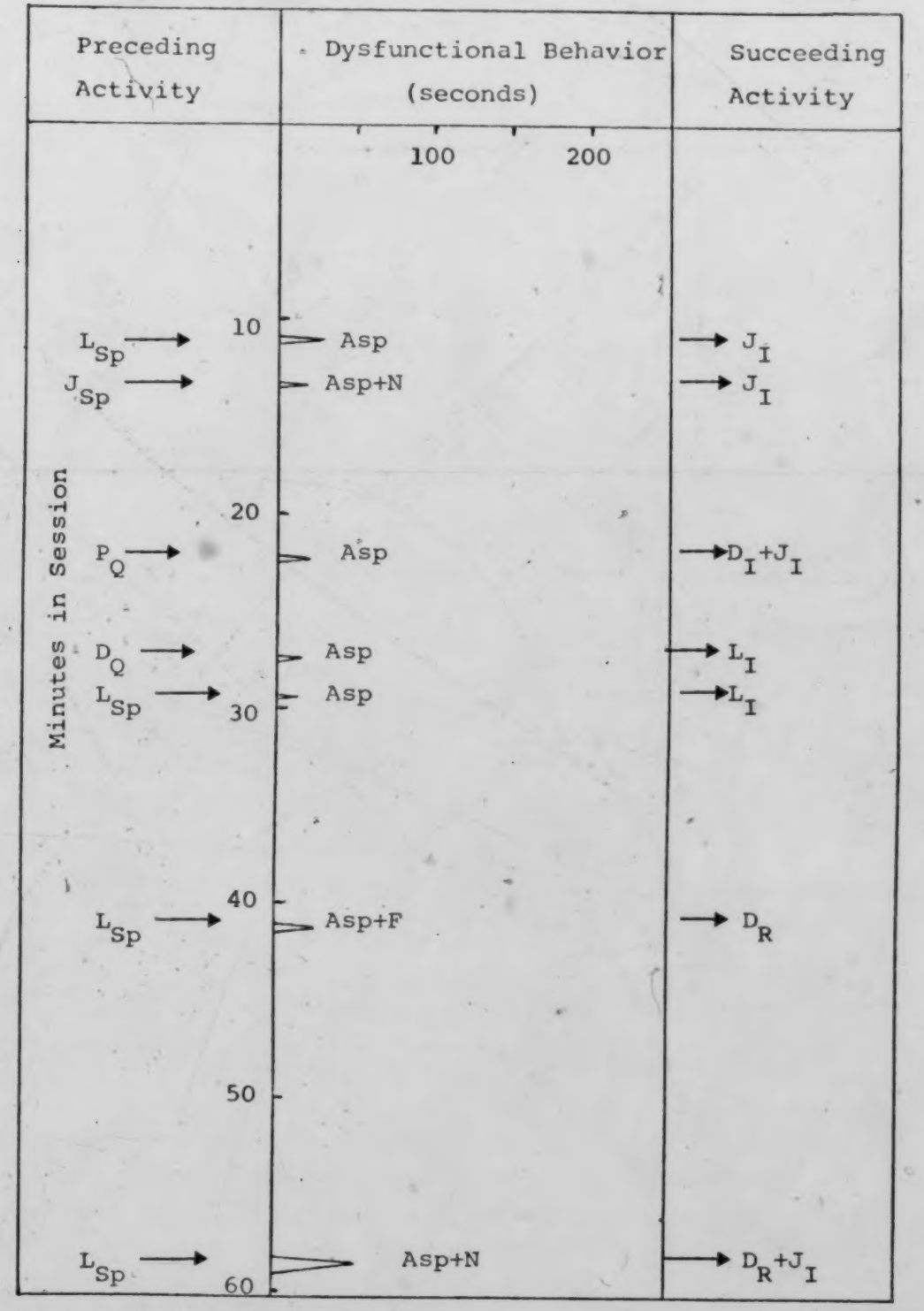
Dave




Coded Dysfunctional Behavior
Session # 1
Wendy
Preceding Activity
Dysfunctional Behavior (seconds)
Succeeding Activity
100
200
Minutes in Session
10
20
30
40
50
60
L_{Sp} (-P)
Asp
L_{Sp*}
L_{Sp}
Asp+F
L_{Sp*}
L_{Sp}
Asp
L_{I}
L_{Sp}
Asp+N
L_{Sp*}
L_{R} (-C)
Asp
L_{Sp*}

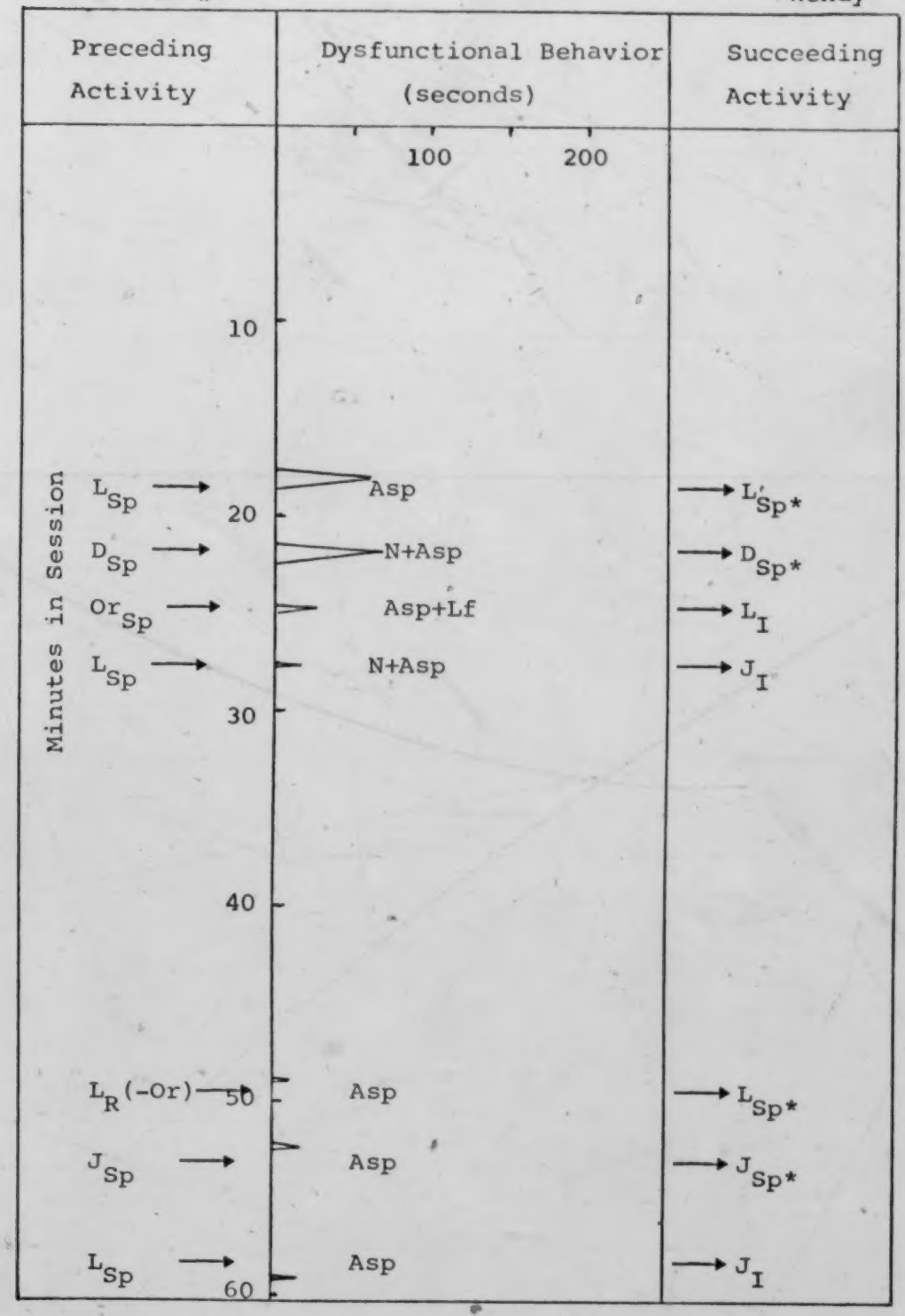
Coded Dysfunctional Behavior

Session # 2 Wendy



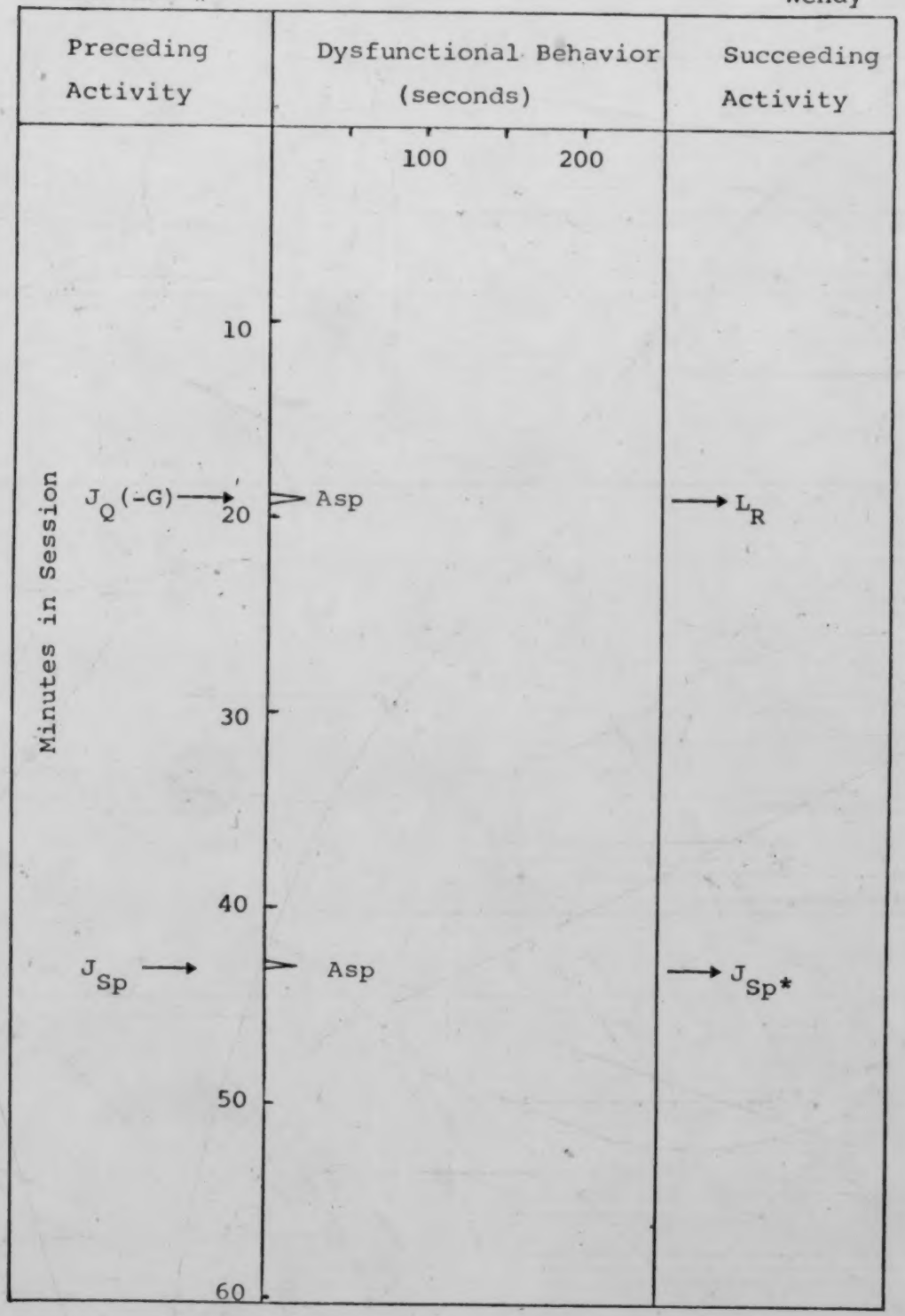
Coded Dysfunctional Behavior

Session #3 Wendy



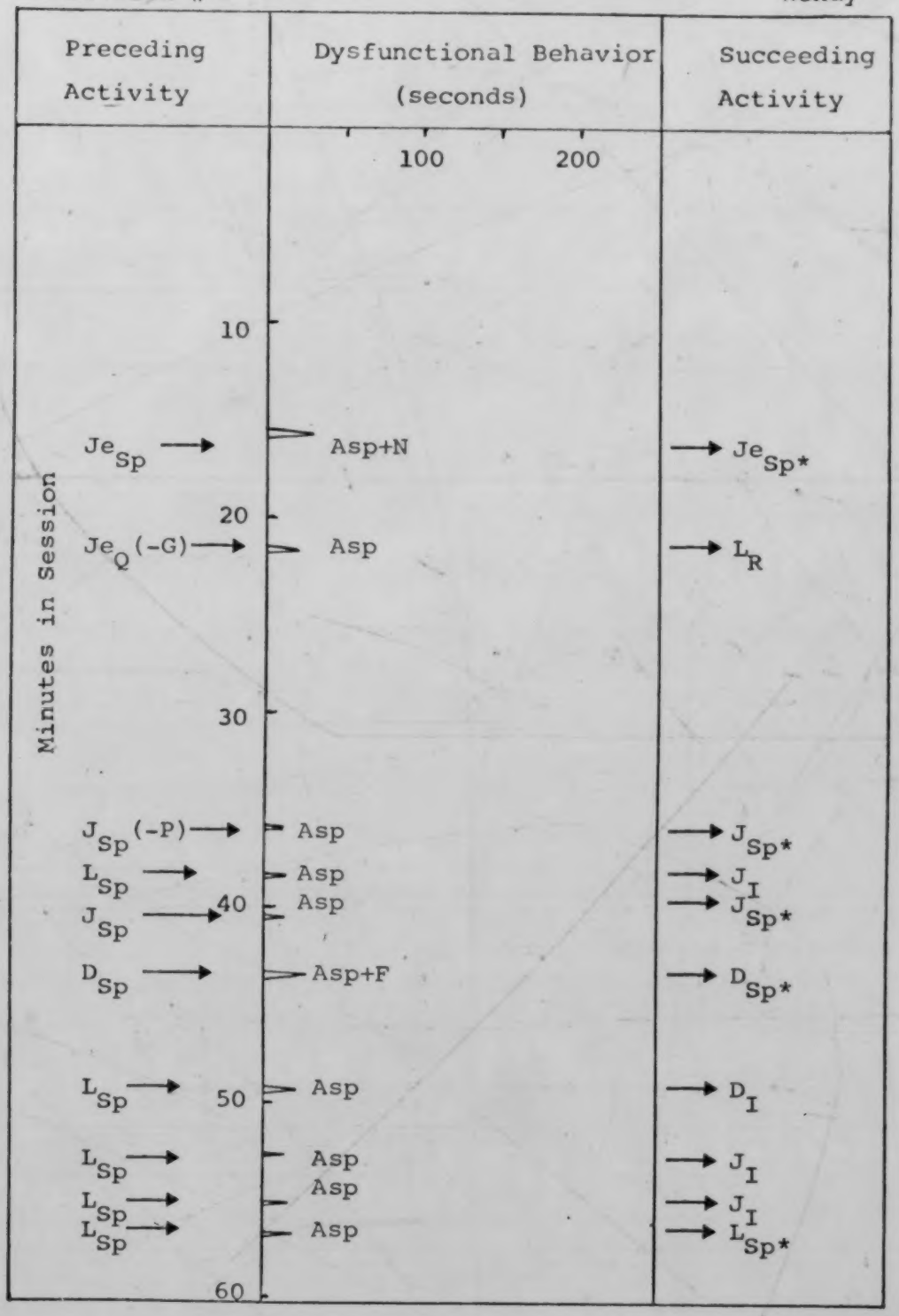
Coded Dysfunctional Behavior

Session # 4 Wendy



Coded Dysfunctional Behavior

Session # 5 Wendy



TABLES

#7 TABLE OF CODED TIME FOR DYSFUNCTIONAL BEHAVIOR

JENNIFER	Total Time per session (seconds)	Total Time Coded (seconds)	No. of seq.	Av. Time per seq. (seconds)	% Time Coded	Coded time/secs. / Total coded time
Session I	3174	586	23	25	18	$\frac{586}{1011}$ = 58%
Session II	3782	300	8	38	8	$\frac{300}{1011}$ = 30%
Session III	3842	40	2	20	1	$\frac{40}{1011}$ = 4%
Session IV	3962	0	0	0	0	0%
Session V	3839	85	4	21	2	$\frac{85}{1011}$ = 8%
Totals	18,599	1,011	37	208	29	100%

CASEY	Total Time per session (seconds)	Total Time Coded (seconds)	No. of seq.	Av. Time per seq. (seconds)	% Time Coded	Coded time/secs. / Total coded time
Session I	3174	508	21	17	16	$\frac{508}{2248}$ = 23%
Session II	3782	875	17	51	23	$\frac{875}{2248}$ = 39%
Session III	3842	219	10	22	6	$\frac{219}{2248}$ = 10%
Session IV	3962	646	14	46	16	$\frac{646}{2248}$ = 28%
Session V	3839	A B S E N T				
Totals	18,599	2,248	62	34	62	100%

#8 TABLE OF CODED TIME FOR DYSFUNCTIONAL BEHAVIOR

ORMA	Total Time per session (seconds)	Total Time Coded (seconds)	No. of seq.	Av. Time per seq. (seconds)	% Time Coded	Orma's coded time/sec. / Total Or's coded time
Session I	3174	30	2	15	1	$\frac{30}{2700}$ = 1%
Session II	3782	547	6	91	14	$\frac{547}{2700}$ = 20%
Session III	3842	300	5	60	8	$\frac{300}{2700}$ = 12%
Session IV	3962	1543	11	140	39	$\frac{1543}{2700}$ = 57%
Session V	3839	280	2	140	7	$\frac{280}{2700}$ = 10%
Totals	18,599	2,700	26	89	69	100%

DAVE	Total Time per session (seconds)	Total Time Coded (seconds)	No. of seq.	Av. Time per seq. (seconds)	% Time Coded	Dave's coded time/sec. / Total D's coded time
Session I	3174	432	14	31	14	$\frac{432}{1292}$ = 33%
Session II	3782	402	20	20	11	$\frac{402}{1292}$ = 31%
Session III	3842	346	11	31	9	$\frac{346}{1292}$ = 27%
Session IV	3962		A B S E N T			
Session V	3839	112	6	19	3	$\frac{112}{1292}$ = 9%
Totals	18,599	1,292	51	25	37	100%

#9 TABLE OF CODED TIME FOR DYSFUNCTIONAL BEHAVIOR

WENDY	Total Time per session (seconds)	Total Time Coded (seconds)	No. of seq.	Av. Time per seq. (seconds)	% Time Coded	Coded time/secs. / Total coded time
Session I	3174	26	5	5.2	.8	$\frac{26}{171} = 15\%$
Session II	3782	81	8	10.1	2.1	$\frac{81}{171} = 47\%$
Session III	3842	27	5	5.4	.7	$\frac{27}{171} = 16\%$
Session IV	3962	8	2	4.0	.2	$\frac{8}{171} = 5\%$
Session V	3839	29	9	3.2	.7	$\frac{29}{171} = 17\%$
Totals	18,599	171	29	5.6	4.6	100%

#10 TABLE OF ALL SUBJECTS' CODED TIME

	Dave	Casey	Jennifer	Orma	Wendy
Total Time attendence over all sessions (seconds)	14,637	14,760	17,039	18,599	18,599
Total time coded as dysfunctional (seconds)	1,292	2,248	1,011	2,700	171
Percentage time coded as dysfunctional	37%	62%	29%	69%	4.6%
Total number of sequences	51	62	37	26	29
Average time per sequence (seconds)	25	34	20.8	89	4.6

FIGURES

SYSTEMS MODEL DIAGRAM

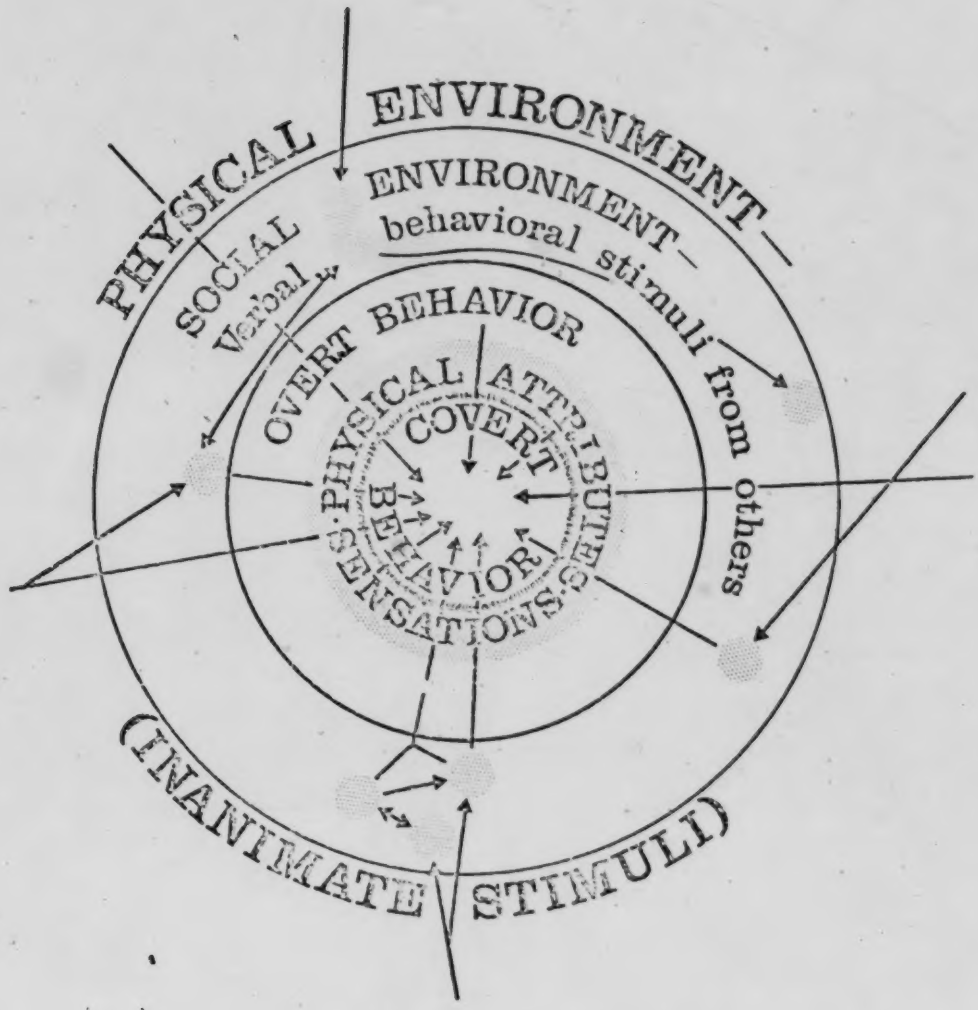
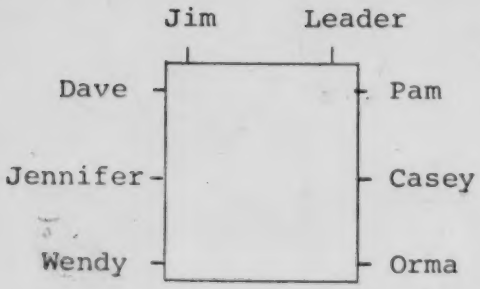


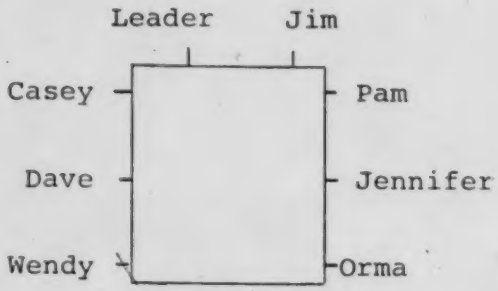
Figure 1.

SEATING POSITIONS SESSION BY SESSION

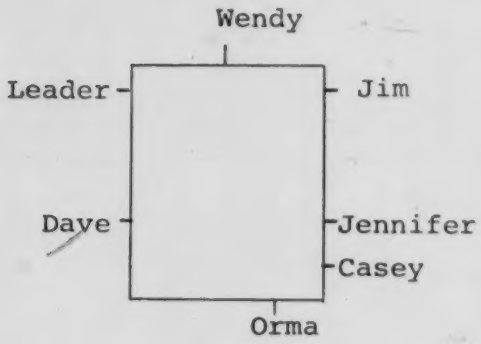
Session 1



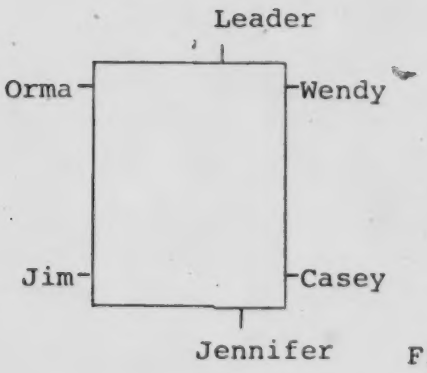
Session 2



Session 3



Session 4



Session 5

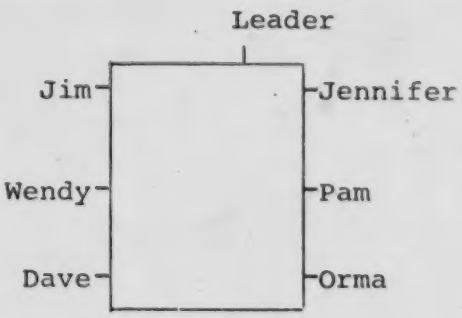


Figure 2